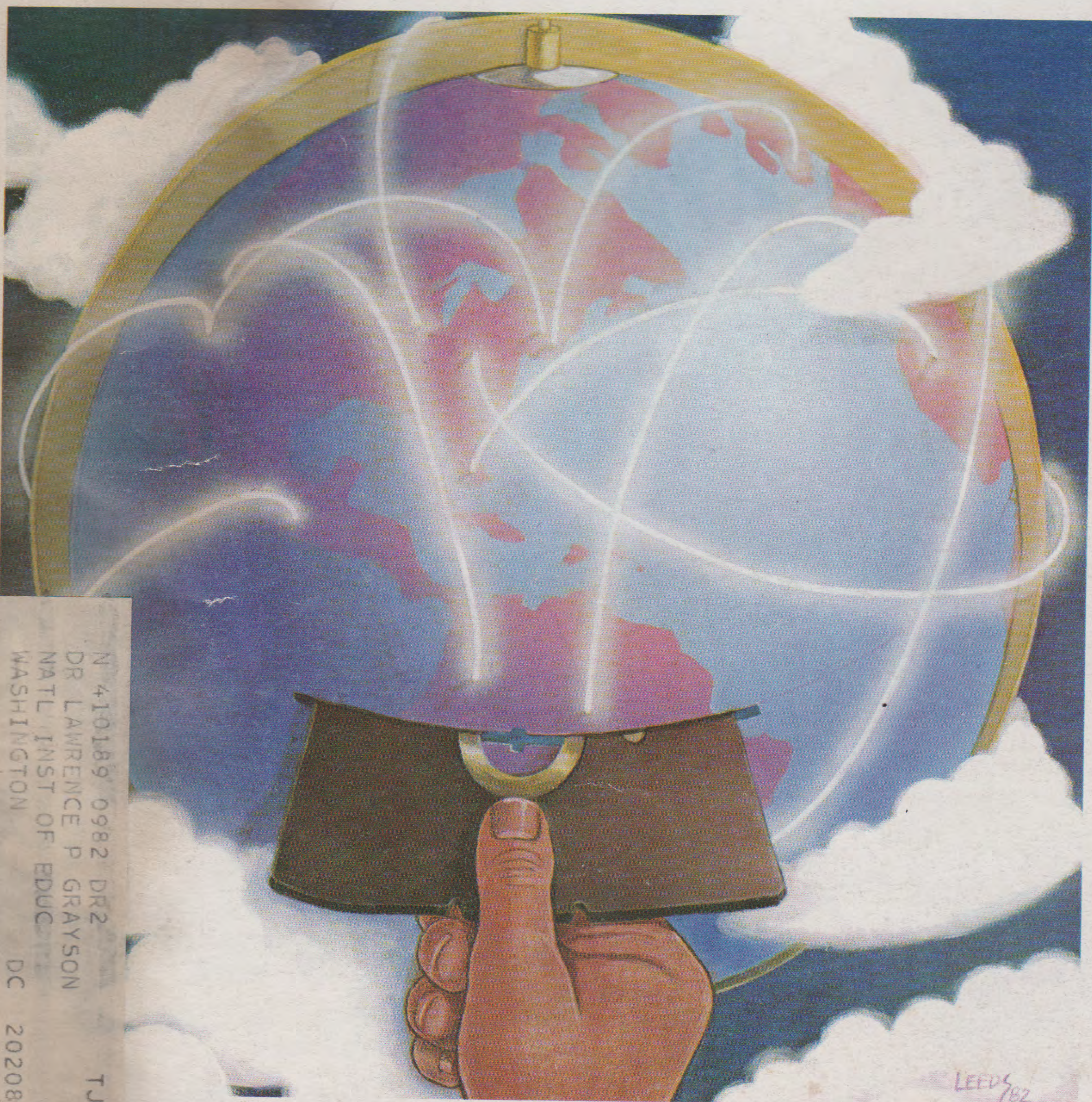


Vol. 10, No. 3, January 1983

# THE JOURNAL

TECHNOLOGICAL • HORIZONS • IN • EDUCATION



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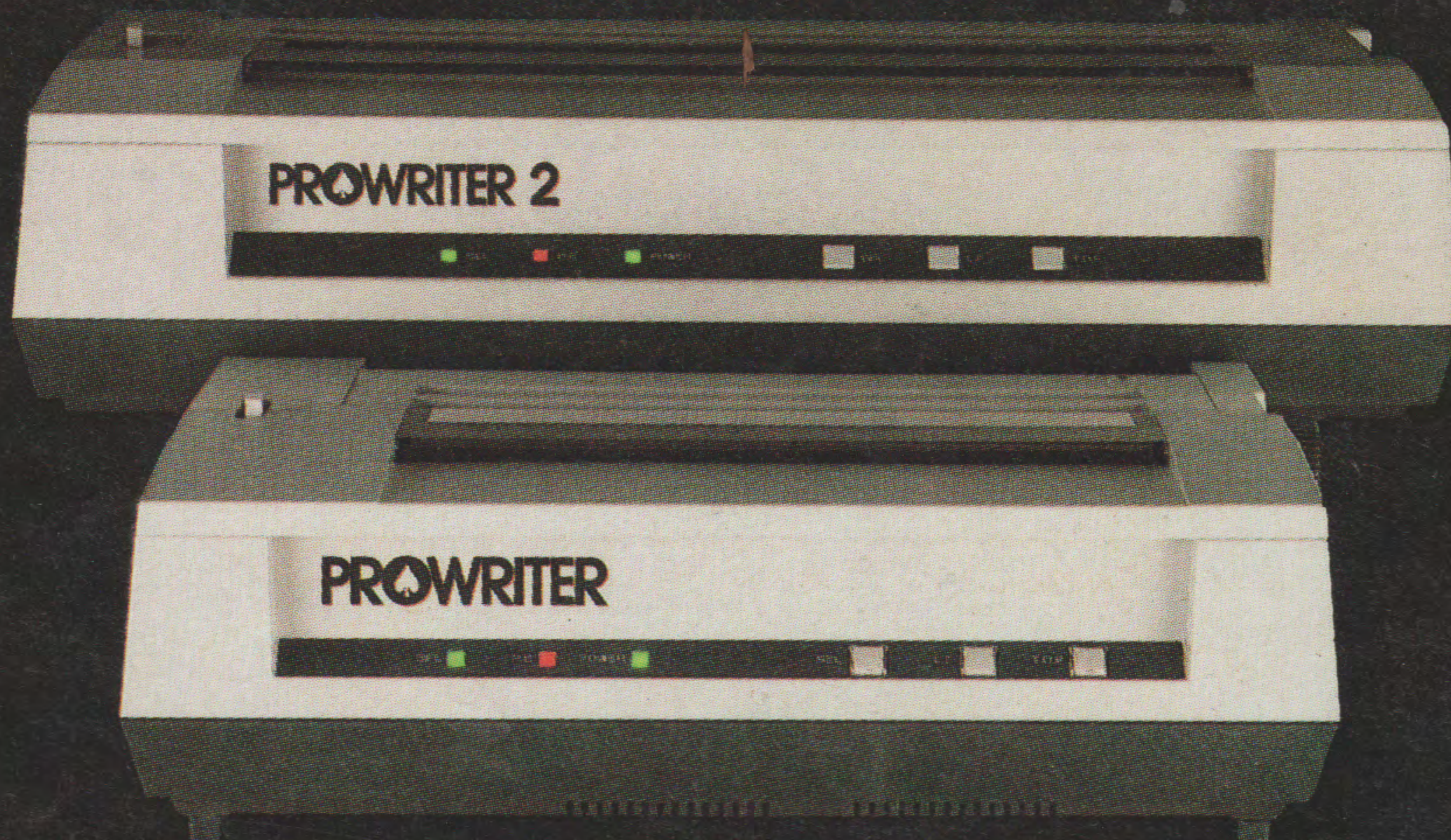
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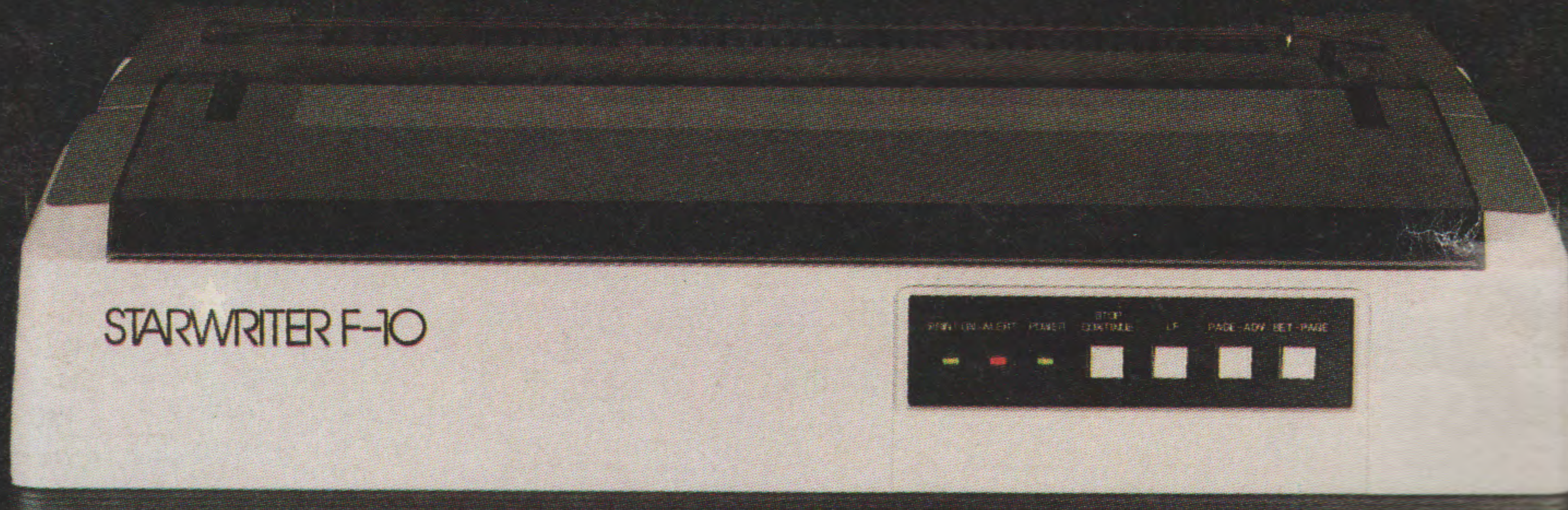
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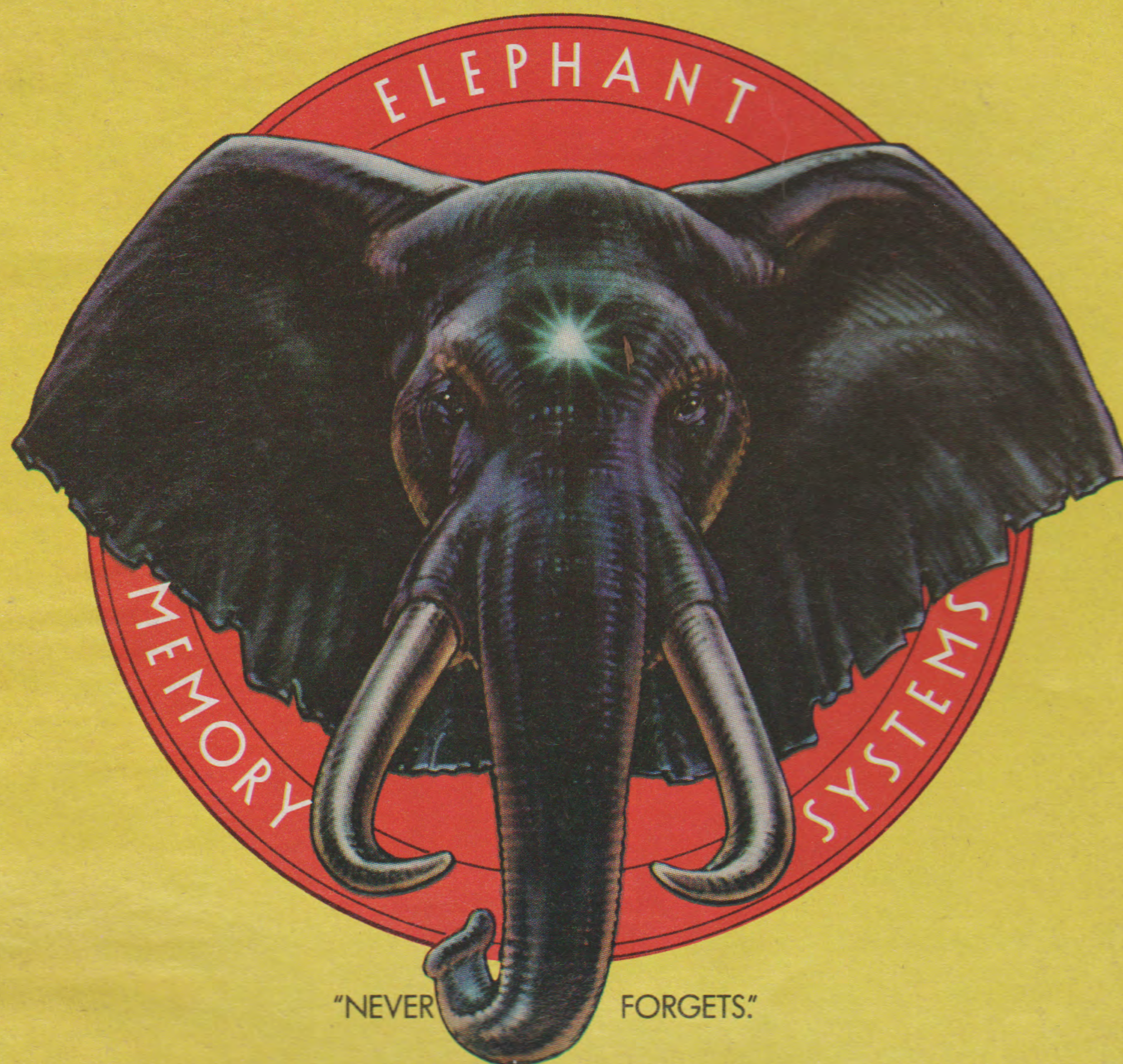


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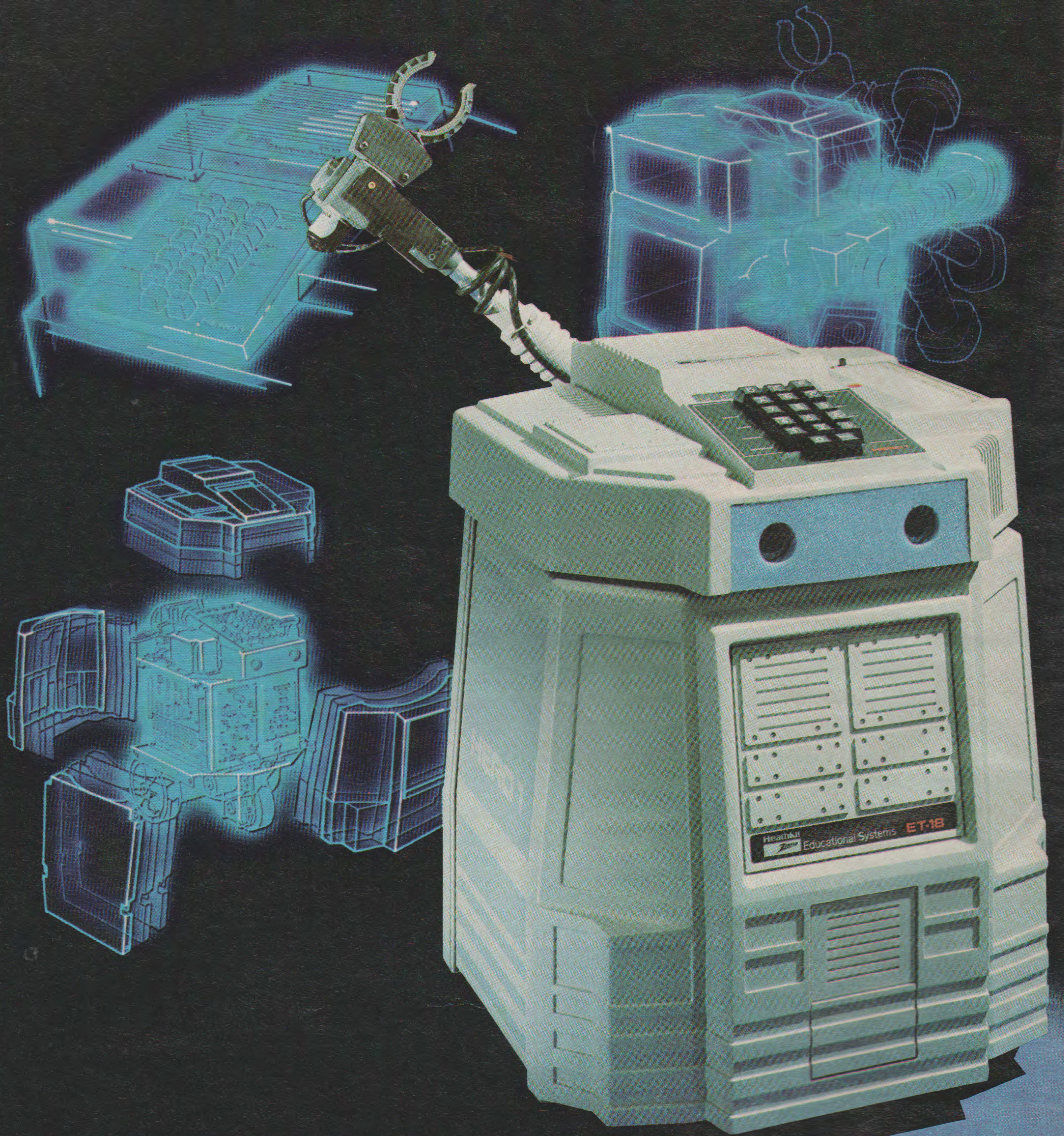
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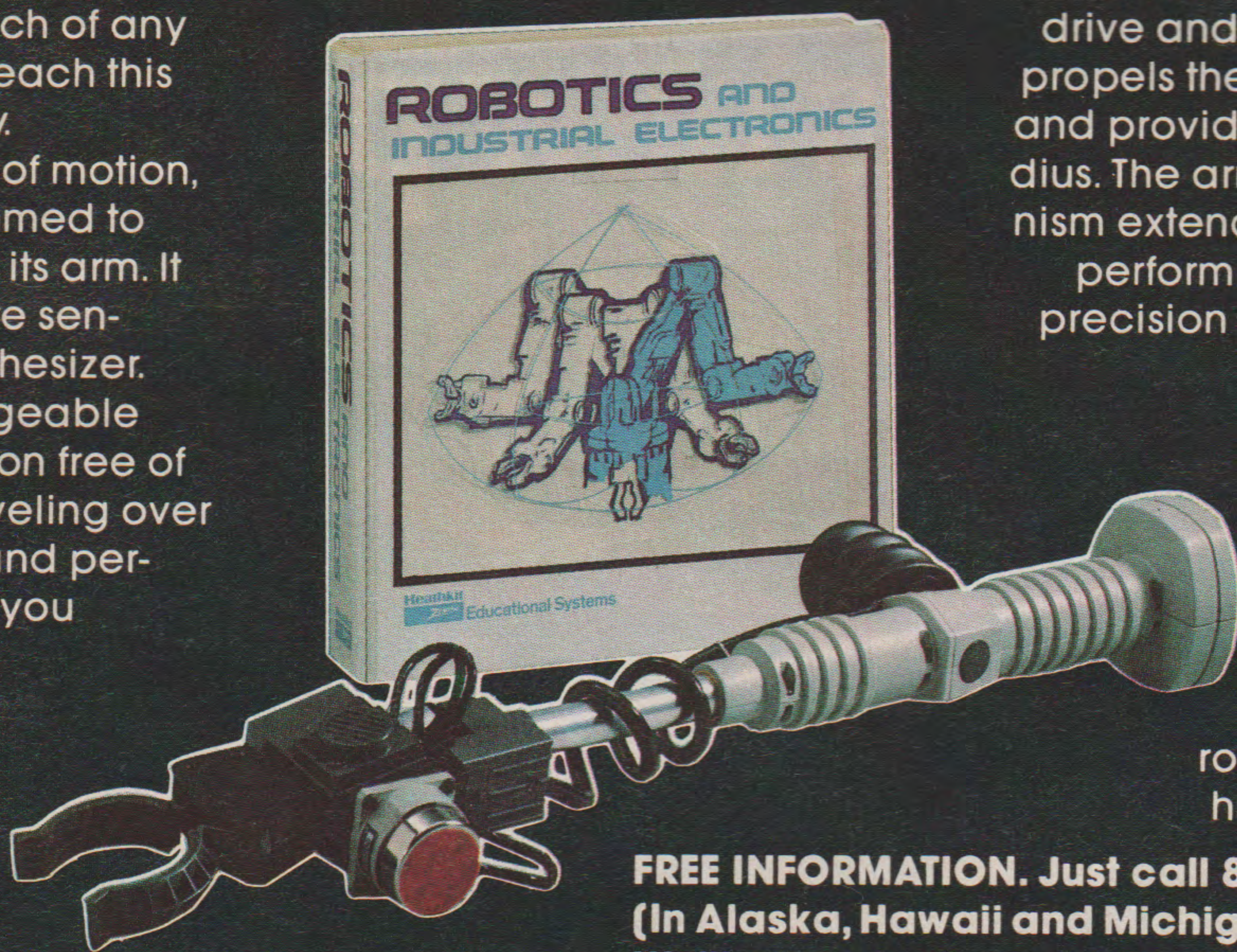
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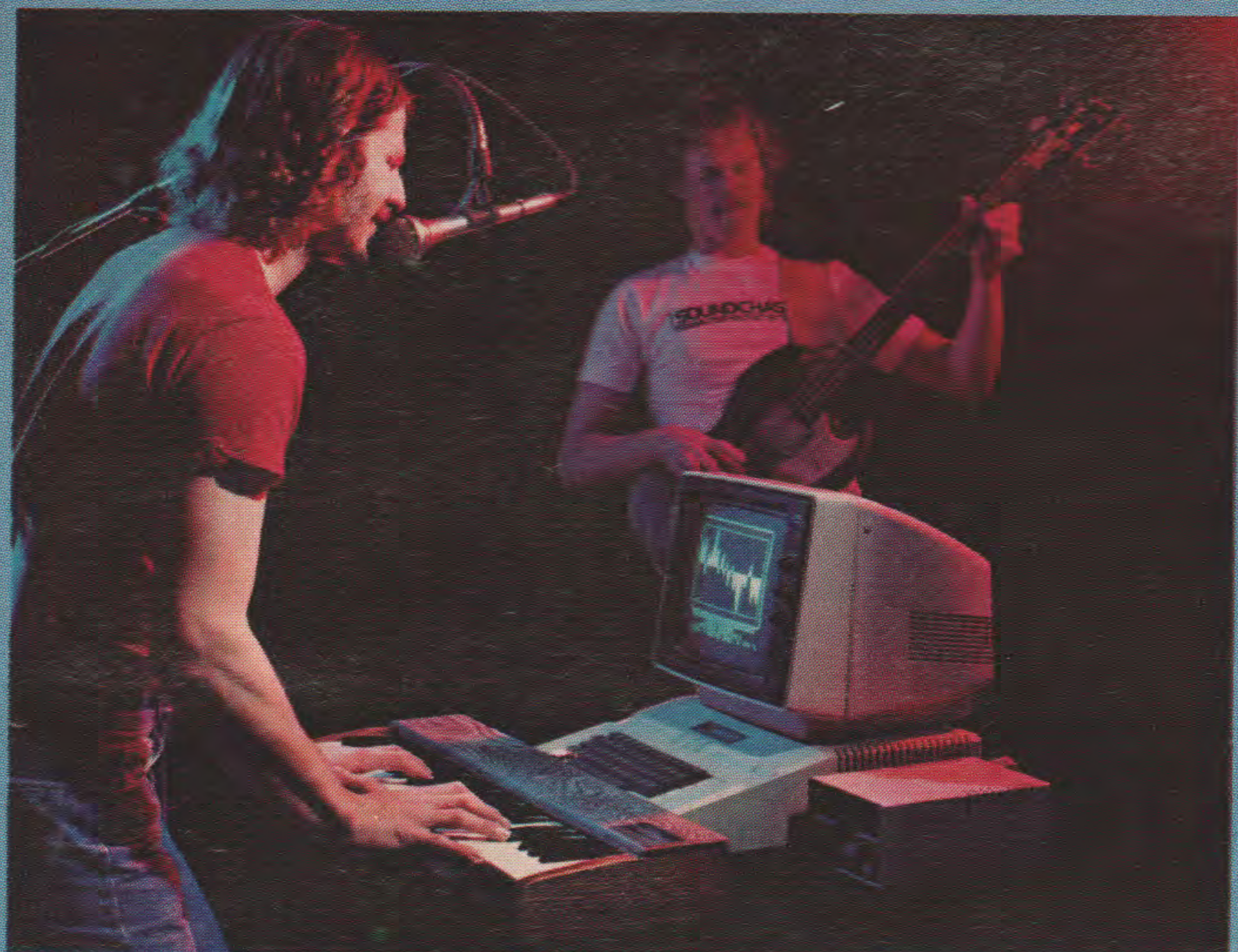
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# Editorial

In one issue each year we share with our readers what is happening in other countries in the area of computers in education. With the expansion of computer utilization the problems of preparing curricula to train people who are not going to be computer scientists is international. How to make effective use of the hardware and software which is becoming more and more available, especially in the education market, is a concern around the world. The capability provided by local, national, and transnational networks will offer us new avenues for sharing which should help spread to the scientific community the latest developments and how these can be utilized.

International organizations are presently addressing the impact of technological change on society and the role of education in helping to cope with these changes. One such organization, The International Federation for Information Processing (IFIP) is involved with information science and technology on behalf of its 42 national member societies, and functions through eight technical committees. The committee concerned with education, TC-3, is chaired by Professor Jacques Hebenstreit of the French Ecole Supérieure d'Electricité. I am fortunate to represent the United States on TC-3.

The aims of TC-3 are defined as follows:

1. To analyze current technological and social trends and identify new needs and areas for educational activities in information processing
2. To establish guidelines for comprehensive training programs and for curricula in informatics
3. To penetrate new educational needs, areas and/or techniques through working groups and conferences in the field of informatics and in its relations to other disciplines
4. To generate material to acquaint the general public with information processing, including translation of these materials into other languages as feasible and desirable
5. To establish and maintain liaison with both national and international organizations with allied interests and foster cooperative action
6. To consider the needs of developing countries as is feasible and possible.

Though national systems differ, it seems the overall problem is the same. How can education, which moves so slowly, take advantage of the rapidly developing technology now available to us?

The United States should be the leader since United States products are the world standards in computer technology, but the investment in applications, especially in the area of education is lagging. The American success in capturing the world market has created a situation in which our products are being copied by other countries as they examine seriously the use of computers as a resource for learning. We need direction! But where will it come from? Most of our efforts in the past, which have been supported by the Federal Government, have been for research and development. Implementation has not been given top priority. With the change in Federal policy, the task now falls to the State and Local governments. California, Florida, and Pennsylvania, for example, have picked up the challenge. Since we are a decentralized government, the need to create new social mechanisms for sharing at the grass roots level becomes even more imperative. That should take top priority.

**Sylvia Sharp**

Editor-in-Chief



# Calendar

**Conference on Interactive Instruction Delivery** will be held on February 9-11, 1983 at the Howard Johnson Motel in Orlando, FL. Presentations will be given on aspects of the use of technology in the development of instruction delivery systems which can be interactive in a variety of modes. A session will be held on authoring of instructional materials to address this topic in the light of differing types of instruction technology and learners. In addition, there will be presentations of a variety of technology systems and applications in interactive instruction delivery, ranging from microcomputers and video-disc to group interactive systems. *Society for Applied Learning Technology*, 50 Culpeper St. Warrenton, VA. 22186; 703/347-0055.

**A Microcomputer Show & Flea Market** will be held on January 22 at the Holiday Inn (North), North Passenger terminal of Newark International Airport, Newark, NJ. This show will include over 50 commercial exhibitors and an indoor fleamarket area. Featured will be hardware, software and accessories for Apple, TRS-80, Atari, Pet, IBM, Heath/Zenith and others. Kengore Corp., 3001 Rte. 27, Franklin Park, NJ 08823; 201/297-2526.

**NAVA '83/COMMTEX International**, to be held on January 19-24 at the Superdome in New Orleans, LA., will present a six-day program of seminars, workshops and specialized conferences and introduce COMMTEX International, NAVA's new trade show for communications and information technologies. The 1983 NAVA Convention and

COMMTEX International offer a unique opportunity for communications professionals to update their knowledge of the latest professional audio-visual communications products, techniques and applications. More than 400 major manufacturers and producers will display thousands of products for communicators in training, health care, corporate communications, government, marketing, religion and education.

A special high technology general session will feature a video teleconference discussion of the combined industry/educator role in promoting microcomputer technology use in schools. Issues to be addressed include planning, financing and how to deal with rapid technological changes and obsolescence. National Audio-Visual Association, 3150 Spring St., Fairfax, VA 22031; 703/273-7200.

**CP/M '83**, an International Conference and Exposition for the CP/M industry and CP/M users, will be held on January 21-23, 1983 at San Francisco's Moscone Center. The Exposition portion of the event will be the largest presentation of CP/M based hardware and software ever assembled. The Seminar and Conference program will include noted leaders from the software industry. Northeast Expositions, 824 Boylston St., Chestnut Hill, MA 02167; 617/739-2000.

**The 67th Annual NASSP Convention & Exhibit** will be held on February 4-7, 1983 at the Dallas Convention Center in Dallas, Texas. Public and private secondary school principals will meet to reexamine the critical concerns of schools today. The theme for the 1983 meeting, Education: An American Essential, will stress the conviction that effective schooling is fundamental to the nation's well being. *National Association of Secondary School Principals*, 1904 Association Drive, Reston, VA 22091; 703/860-0200.

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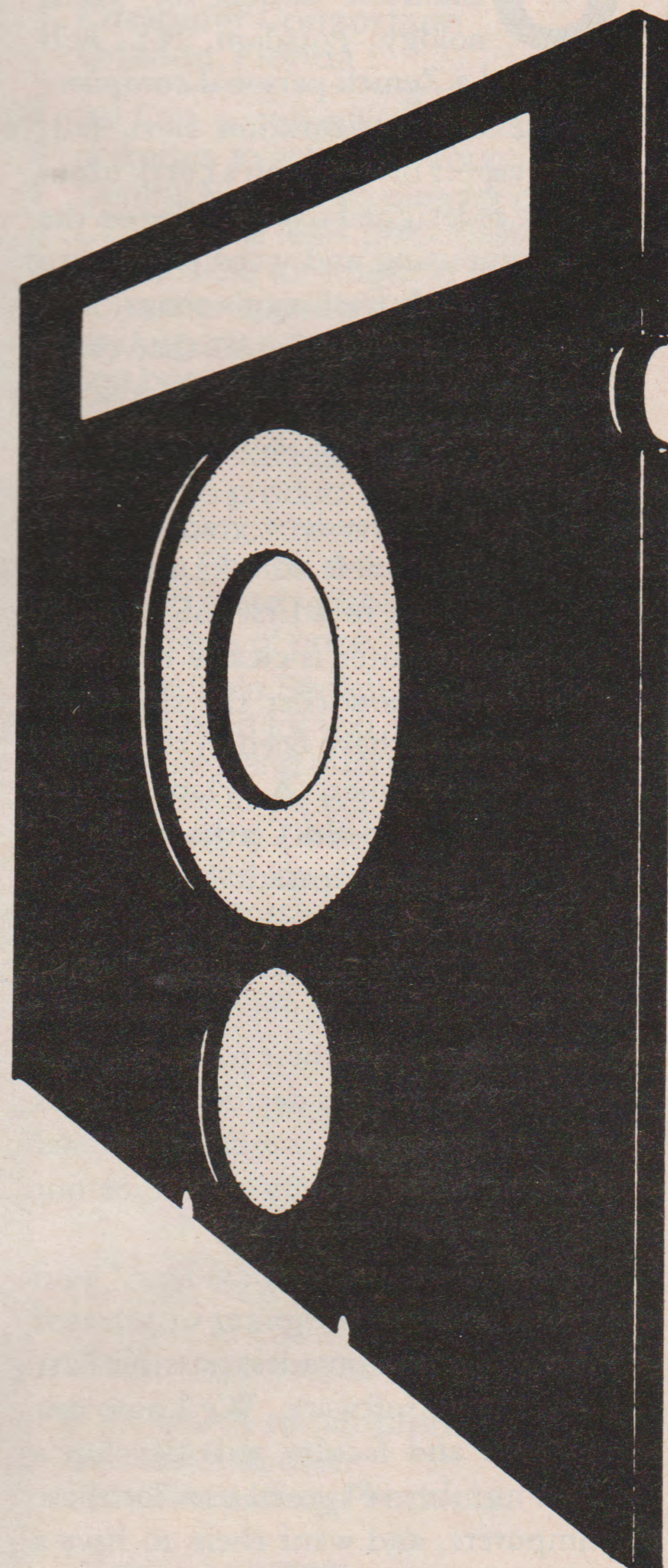
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# News

## Clarkson First College To Require Computer Literacy

**O**ne thousand freshmen at Clarkson College of Technology, Potsdam, NY, will be issued a Zenith personal computer during their orientation next fall. Every aspect of Clarkson's curriculum will be redesigned to capitalize on the new computing and word processing power in each freshman's room. The program will continue so that every one of Clarkson's 3,800 undergraduates has his or her own desktop computer.

When each student graduates, he or she will be able to take the computer home or to a first job.

"The computer is clearly the same kind of tool now that the slide rule and calculator have been in the recent past," said Robert A. Plane, president of 86-year-old Clarkson, a private college in upstate New York. "Our goal has always been to provide our young people with the skills, knowledge and cultural openness that are important for their total development. Our trustees decided two years ago that we should integrate personal computing into every aspect of our education at Clarkson."

"It was immediately evident," said Plane, "that the computer we selected should have the broadest possible base of available software. We know our students and faculty will develop a large number of special uses for these computers, and want them to have a large library of programs and languages from which to choose."

"The committee decided that the computer we would select should use a microprocessor from Intel Corporation's 8085 8-bit and 8086/8088 family of 16-bit devices. The Zenith Data Systems' Z-100 personal computer uses both an 8085 and 8088, which allows it to run either eight-bit or 16-bit computer programs."

The financial ramifications of the decision were studied by William A. Dempsey, Clarkson's vice president.

The retail value of the machine and software is in excess of \$5,000. The cost will be subsidized by restricted grants so that students will pay only \$200 per semester and a one-time \$200 maintenance deposit fee. At the end of four years, title to the computer passes to the student.

David Bray, professor of electrical and computer engineering, was named to a new post, dean of educational computing systems, to oversee the application of the personal computer to all phases of the Clarkson curriculum.

Languages available on the students' Z-100s will include *FORTRAN*, *Z-BASIC* and *Pascal*. Each student will be supplied with *Multiplan*, a spreadsheet software program for financial analysis. Clarkson is currently in the process of selecting a word processing program for the student computers.

"Meanwhile," said Bray, "we will use a home-grown word processing program generated here at Clarkson, which we call *Galahad*. It is published by our campus group, 'Golden Knights Software'."

Intel Corporation of Santa Clara, Calif., will donate a complete set of training materials to Clarkson. Several units of the computer science curriculum will be devoted to the study of the internal architecture of the Intel 8086 and subsequent 16-bit, single-chip microcomputers.

Clarkson plans to study the various schemes for networking the student computers with each other and with Clarkson's central computer, an IBM 4341 Mod II.

"I am convinced that Carl Sagan is correct in predicting that the next development in human intelligence will be a partnership between intelligent humans and intelligent machines," said Plane. "That intellectual development will begin at the college level when Clarkson courses in all disciplines are aided by student use of the personal computer."

**Circle No. 389 on Inquiry Card**

## Proposal Theme For Educational Grants Program

**R**adio Shack is setting the subject for proposals in the fourth submission cycle of the TRS-80 Educational Grants Program as "Unique and Innovative Microcomputer Applications in Education." Deadline for submissions under this theme is March 31, 1983.

The Tandy TRS-80 Educational Grants Program is designed to encourage and support the successful application of microcomputer technology in U.S. educational institutions. Through the program, TRS-80 hardware, software, courseware and related products totaling \$500,000 per year will be awarded to individuals and non-profit organizations whose proposals are selected in four quarterly cycles as providing the greatest benefit to the American educational community under selected proposal themes. Equipment is allocated based on the recommendations of an impartial Educational Grants Review Board comprised of a number of distinguished educators.

**Circle No. 393 on Inquiry Card**

## Control Data Announces PLATO Courses for Microcomputers

**C**ontrol Data recently announced that for the first time it is producing courses for a variety of microcomputers from its renowned PLATO library.

The initial offering of nine courses is the first in a continuous stream of software planned for the education market.

"We are using the expertise we have developed over 20 years to produce courses that don't just educate students but stimulate and motivate them, too," said T.W. Miller, vice president of Business Development.

PLATO computer-based education is a highly interactive method of



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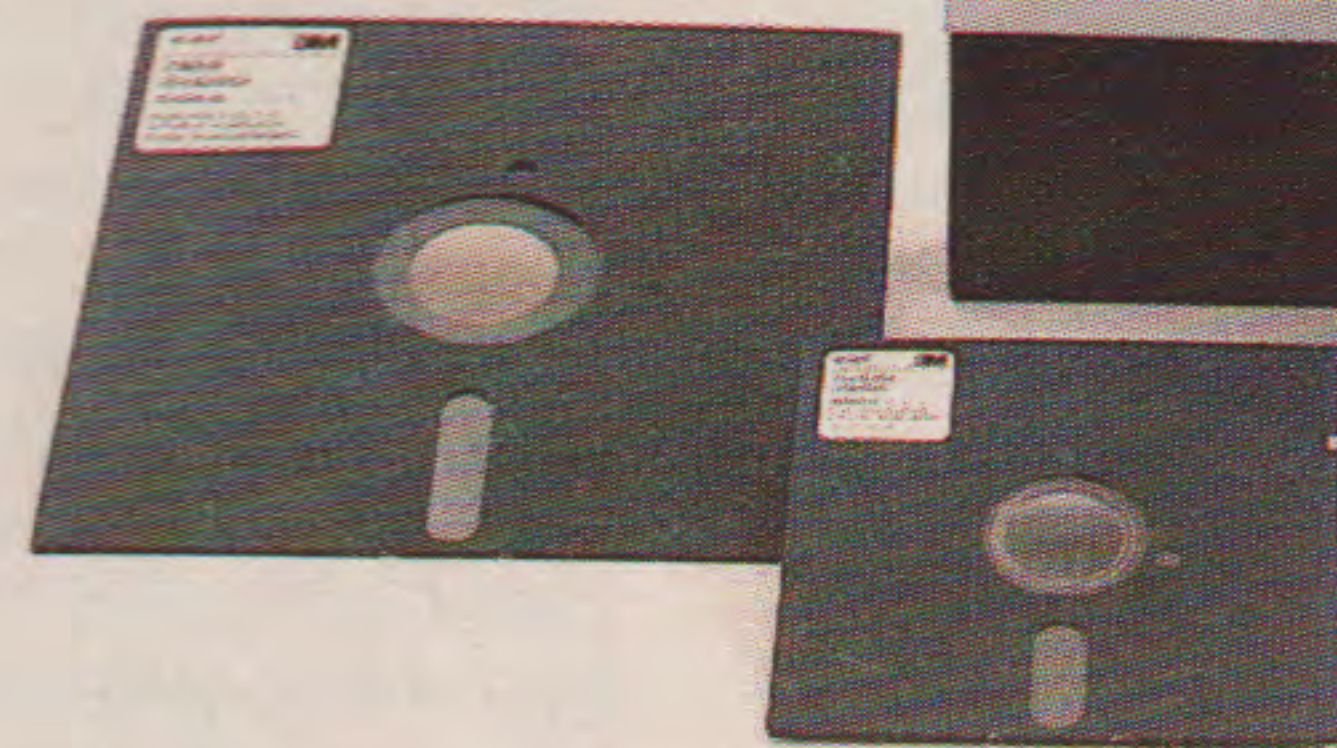
**Bill Friis, Director  
Central Florida Educational  
Computer Consortium  
Orlando, Florida**

Bill Friis supplies thousands of 5¼" diskettes to schools throughout Central Florida. As director of CFECC, Bill feels personally responsible for whetting the computer appetites of students, kindergarten through college. He first began his search for the ideal diskette over 3 years ago. He chose Scotch diskettes because he wanted a reliable product with a known performance record. Now he's sold on Scotch diskettes. "There's nothing more reliable on the market, regardless of price," insists Bill.

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Scotch 8" and 5¼" diskettes are compatible with personal computers like Apple II and III, TRS-80, Pet, TI and IBM, to name a few. Get them from your local 3M distributor. For the one nearest you, call toll-free: 800-328-1300. (In Minnesota, call collect: 612-736-9625.) Ask for the Data Recording Products Division. In Canada, contact 3M Canada, Inc., Ontario.

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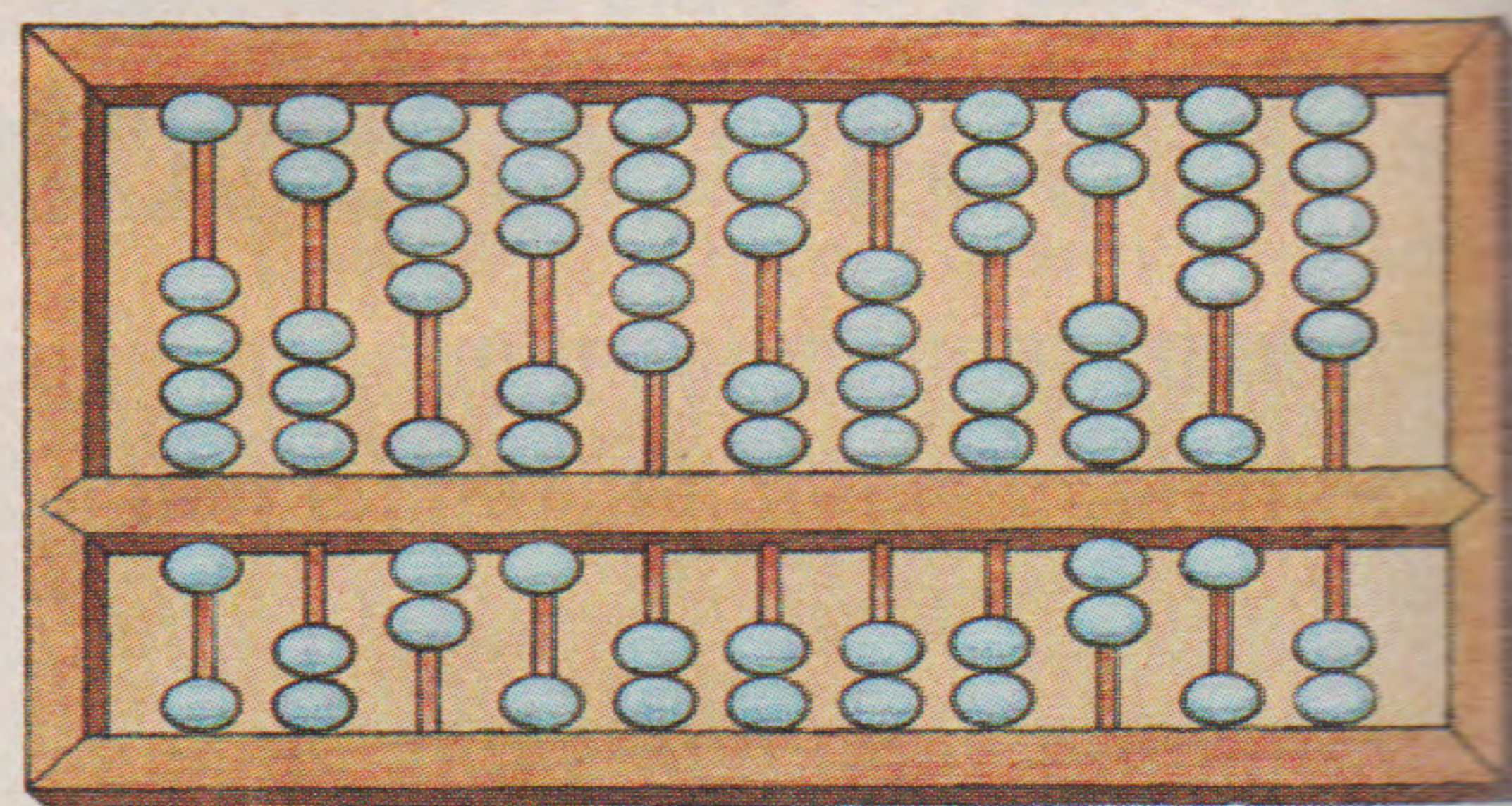
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**3M**



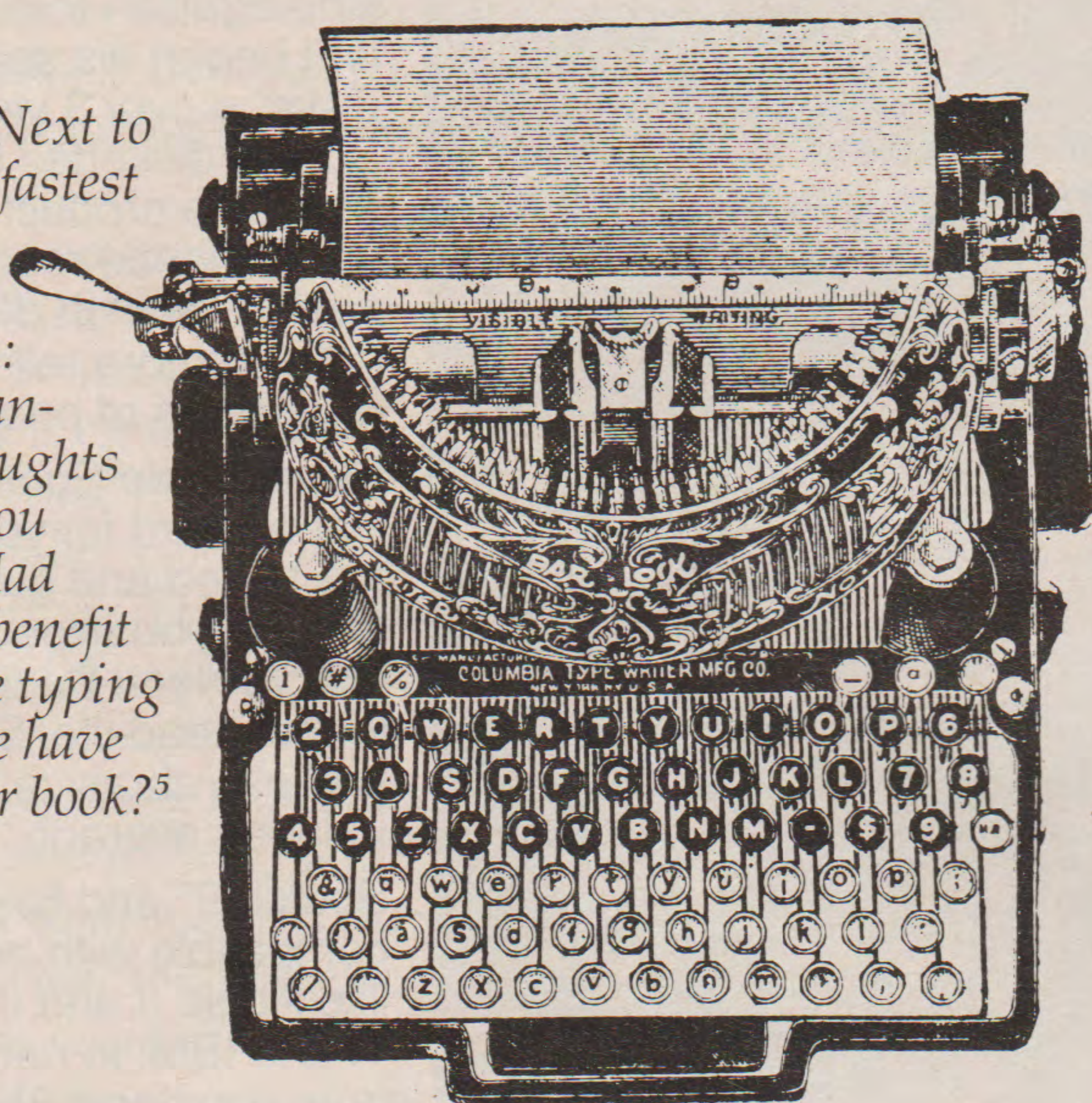
# NOTES ON THE ORIGINS AND CAUSES

Paper. First century AD, China. Information becomes a more abundant resource. But now has paper itself become too abundant? The plague of the 20th century office: Clutter.<sup>1</sup>



The abacus. Early hardware. Until recently it was, in the hands of a skilled operator, actually faster than a computer. Note: "Skilled operator."<sup>2</sup>

The keyboard. Next to shorthand, the fastest writing system known to man. Question: If you could transcribe your thoughts faster, would you think faster? Had Cervantes the benefit of even average typing skills, would he have written another book?<sup>3</sup>



The telephone. The ideal of communication: Sharing information quickly. The miracle isn't: "Mr. Watson, come here. I need you." It's that Mr. Watson came, instantly.<sup>4</sup>



The encyclopaedia. By definition, all current and essential information compiled and made accessible to the non-specialist. A fourteen-volume learning tool.<sup>6</sup>



<sup>1</sup>It is to be noted, in general, that Digital Equipment Corporation's computer systems place particular stress on the elimination of many routine administrative chores involving paper, such as student registration, class scheduling, budget accounting.

<sup>2</sup>As recently as ten years ago it was the consensus that there would gradually come into being a sort of "computer priest class," who alone would consult these electronic oracles. Today, thanks to accessible systems—Digital's VAX, in particular—computer literacy is fast becoming accepted as a basic skill, like reading.

<sup>3</sup>An alternative to the postal system is developing between computer-connected parties: Electronic mail on the VAX system. VAX comput-

ers at different branch-campuses routinely exchange and transmit even lengthy written communications. Finding a stamp, a chronically irritating chore, becomes a thing of the past.

<sup>4</sup>Imagine a twist: What if Watson had been out? (Or his phone had been busy!) What if you wanted to ask a colleague in London a question. Would you call him at 1 A.M. his time? Or would you use a terminal to relay your question (via DECmail) to his terminal—guaranteed it would get to him?

<sup>5</sup>Cervantes was sometimes an inattentive writer. Had he the benefit of what any freshman can have today—a computer to "converse with"—his terminal might have flashed him "...Hold it! Two pages ago you said that person's name was

spelled..." On the vast potential of student time sharing, consider that with current VAX technology it is perfectly possible for a motivated student to sit down at a terminal for a minute between classes and simulate the moon's gravitational system.

<sup>6</sup>The encyclopaedia, if taken one more step, becomes computer-based education: An infinitely patient computer conducting a student through a simulated chemistry experiment step by step. Let him see the consequences of adding water to sulphuric acid. Obviously, this requires a computer terminal screen with exceptional graphics capability, like Digital's GIGI terminal.

<sup>7</sup>A telling comparison: To get out an annual ca-

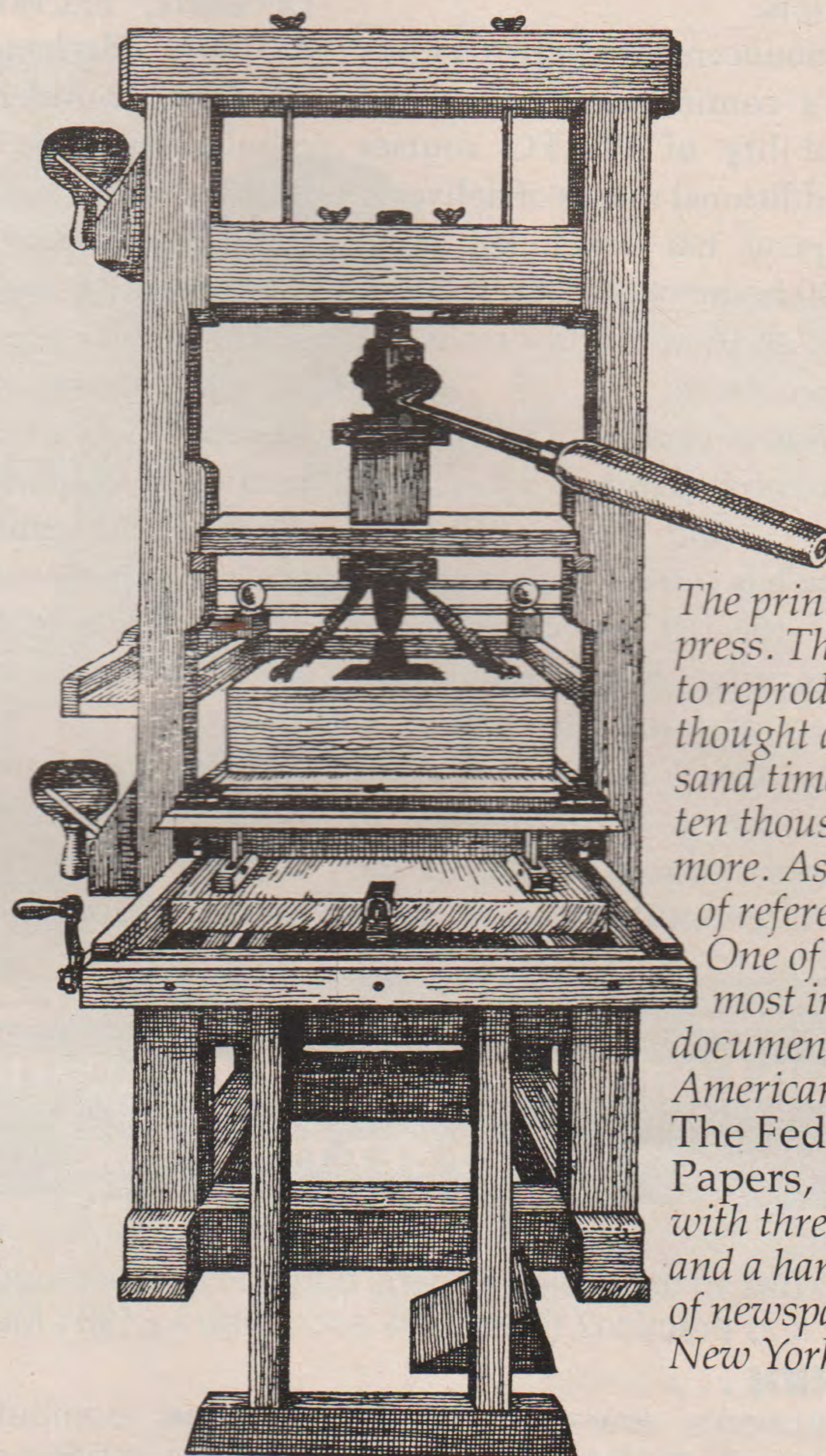
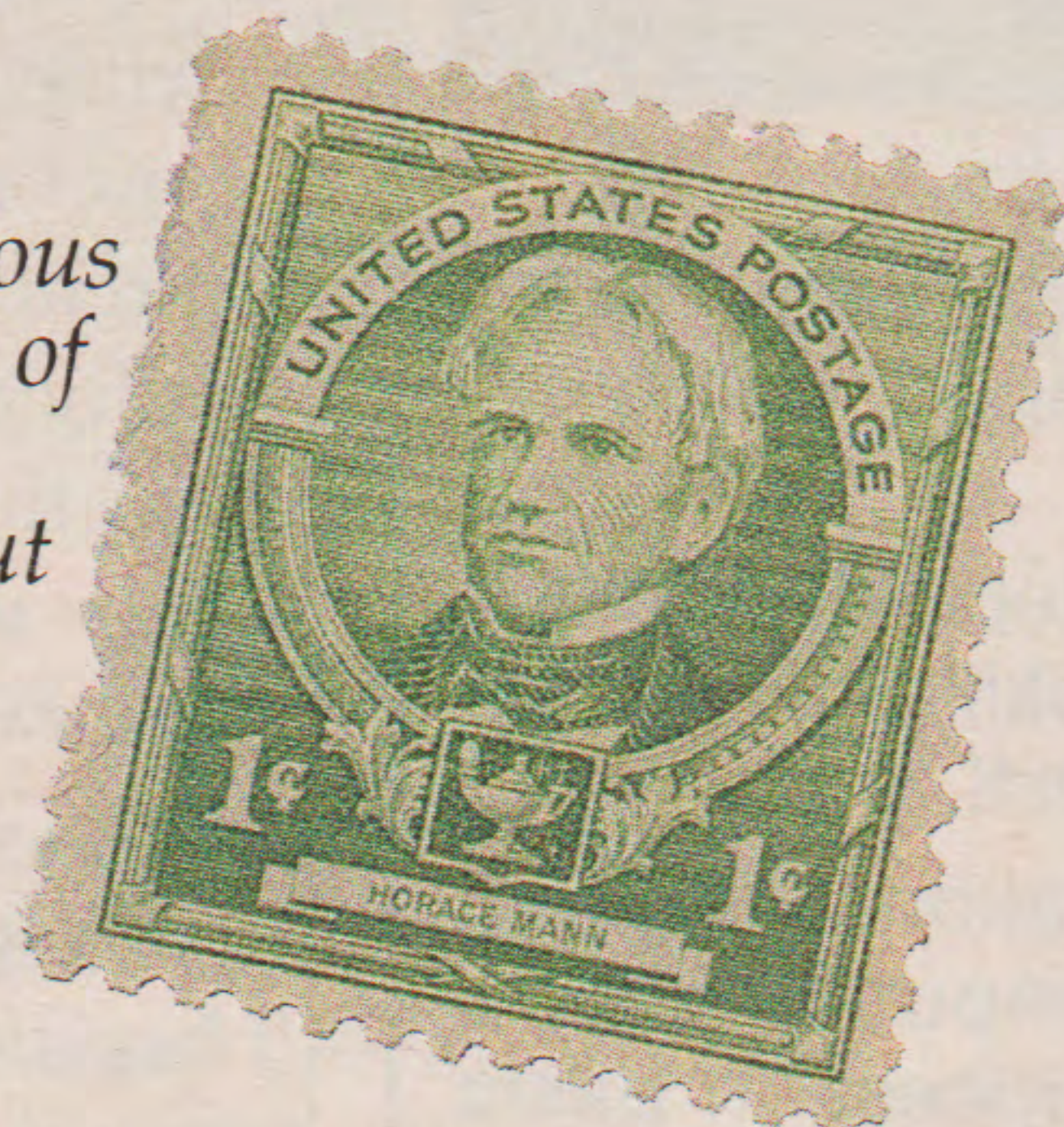


# OF THE COMPUTER REVOLUTION.



TV. Significant because many forms of information simply need pictures. Imagine you had to describe a Rubik's cube in writing. Or discuss the operation of the law of supply and demand on Australian wheat consumption in twenty-five words or less.<sup>8</sup>

The mail. The most ambitious system for the distribution of information in the world. Awesome in conception, but less than foolproof.<sup>3</sup>



The printing press. The ability to reproduce a thought a thousand times. Then ten thousand more. As a point of reference: One of the most influential documents in American history, The Federalist Papers, began with three men and a handful of newspapers in New York state.<sup>7</sup>

**Digital Equipment Corporation.** Suppliers of educational computer systems, office information systems, word processors and personal computers, and software for students, faculty, administrators, office managers, and anybody who works with ideas.

For more information, write: Digital Equipment Corporation, Education Computer Systems Group, Media Response Manager, PK03-2/M94, 129 Parker St., Dept. TJ-1-83, Maynard, MA 01754.

lege catalogue, it takes on the average a staff of 25, working 40 hours a week for 20 weeks. There now exists a text management system, DECset, which would accept data coming from the many various sources, fit it all together, adjust it all to sudden revisions, produce galleys ready for paste-up, and finally, put them onto film. There are implications here for the academic press, in that DECset may make the publishing of specialized works economically feasible.

<sup>8</sup>Significant also as a personal and portable source of information. A \$60 window on the world that can be set up on anybody's kitchen table, television is a very close ancestor of the modern personal computer. This comparison may be developed: 1) Like TV, personal computers are to

be found in student unions, dining halls, dormitories, sororities—no longer just in labs; 2) They can be linked to each other and to other computer systems on campus to share information among them, forming a kind of 'two way' television network. Digital Equipment Corporation has, incidentally, carried this ability of computers to communicate with each other farther than has any other company. At this writing, there are no serious rivals to its DECnet networking approach which allows personal computers, word processors, terminals, VAXs, and DECsystems to share information.

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self-paced, one-to-one instruction. For the first time, PLATO lessons can be used by schools and homes which have Apple II Plus, Atari 800 and Texas Instruments 99/4A microcomputers.

The announcement confirms Control Data's commitment to expand the availability of PLATO courses through additional means of delivery. The company has developed more than 8,000 hours of courses, ranging from basic skills to highly technical training programs.

"The time of classroom acceptance of the microcomputer as a teaching tool is here," said Miller. "PLATO courseware has earned high marks in classrooms the last two decades and proved its value before microcomputers were around. The advent of microcomputers means PLATO courseware has a better chance of making contributions in schools and homes throughout the country. With

thousands of microcomputers now in use, it makes sense to have PLATO courses available for many of them."

The first nine lessons are: Basic Numbers Facts, Whole Numbers, Decimals, Fractions, Physics: Elementary Mechanics, French Vocabulary Builder, German Vocabulary Builder, Spanish Vocabulary Builder and Computer Literacy: Introduction. Some lessons cover elementary skills, while others address junior high or senior high skills. Like all PLATO courses, these are designed to meet specific teaching objectives and are individualized, modularized and reinforced with innovative supporting materials. These documents include strategies for integrating microcomputers into the classroom.

Plato computer-based education has been tested and used by more than 25,000 children and adults in a variety of applications, ranging from

pilot training to teaching the ancient Ojibwa languages to Chippewas in Wisconsin. Today PLATO computer-based education can be found in more than 100 schools, colleges and universities.

**Circle No. 392 on Inquiry Card**

## DPMA Education Foundation Establishes Grants and Awards Program

**T**he Data Processing Management Association Education Foundation (DPMA-EF) has established a grants and awards program to provide funding for the projects that further education in the areas of information processing, computer science and computer applications in business.

In announcing the program, Education Foundation President William Hetzel, Ph.D., CDP, said "the Foundation is concerned that innovative and imaginative thinking is not being applied to education of computer information professionals to the extent necessary. There is a wealth of individual talent in this country with excellent ideas just waiting for a little help to get them going. The grants and awards program can provide that help."

A proposal evaluation committee has been established to review and recommend action on the proposals. The committee is chaired by Bruce E. Spiro, CDP, a member of the Education Foundation Board of Regents and chief of the ADPE Systems Management Office of the Defense Communications Agency.

DPM, a not-for-profit organization, was established in 1975 to meet the changing educational requirements of the information processing profession.

In March of 1982, the Education Foundation awarded its first grant to the University of Evansville to support fellowships in data processing.

**Circle No. 399 on Inquiry Card**

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# Some kids will sit in front of the tube all day if you let them.



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In educational publications like this one, you read constantly about the joy of learning that the small computer has brought to the classroom.

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**Circle No. 28 on Inquiry Card**



## Ed•Com '82 — A Success

**T**he National Computer Conference and Exposition designed just for educators, recently completed its first conference in Los Angeles, October 21-24. The response to Ed•Com '82 by the 2,300 attendees was extremely positive. Comments from attendees about the conference were that it was well organized, very informative with excellent quality of exhibits. Exhibitors and attendees were impressed with the cross fertilization of ideas and the fact that all levels of educators were in attendance.

The four-day conference included 300 session hours offered by the top educators in the country who shared their expertise and abilities into the phenomenal impact computer technology has and will continue to have on all levels of public and private education.

Governor Edmund G. Brown, Jr., a strong supporter of computers in education, laid the foundation for the conference stressing the imperative need for computers in education during his keynote address. Brown has initiated many proposals which will move California into the forefront of implementing computers in education. Brown emphasized the need to take his computer in education plan, "Investment in People Programming" and develop it into a national program. "Investment in People Programming" Plan will establish 15 regional computer literacy centers throughout California. A major role of these centers will be to instruct computer science to the current roster of California teachers.

Special events were luncheon addresses on Friday and Saturday by Sylvia Chorp, Director of Instructional Systems for the Philadelphia Public Schools and Andrew Molnar, Acting Director of the Science Education Project at the National Science Foundation and the closing address given by David Moursund, author, professor and publisher of the *Computing Teacher*. These three presentations

stressing the importance for all levels of government, teachers and parents to examine needs of the student and the present curriculum and devise a plan for the future ways technology can facilitate the learning process. Implementing new ideas into the education field is an extremely slow process, so all decision for change must be carefully evaluated.

Through hands-on sessions, workshops, and seminars, 115 presentors extensively covered the areas of creating curriculum and instructing techniques, developing and conducting in-service training, hardware and software decisions, employing administrative and classroom management techniques, and designing computer assisted instruction. The attendees were impressed with the quality, quantity, and range of presentations.

The well-attended MicroCourses were a special feature introduced at Ed•Com '82 in the specific areas as Logo, BASIC Programming, Word Processing and Forth. These courses provided participants additional valuable information than can be incorporated into their school systems.

Attendees were able to participate in panels discussing controversial issues pertaining to computers in education. The topics were: 1) the unresolved copyright controversy, 2) the needs of teachers and recommended

action for in-service training and 3) problems, implications and predictions relating to the role computers will play in future educational instruction. The panels gave individuals the opportunity to understand different facets of the issues pertaining to all levels of education and government. These panels facilitated the concept that all educators must take an objective view in deciding the future of computers in education.

Integral to the entire conference was the presence and support of over 100 vendors who participated in an impressive showcase of products and services. Equipment and software for use in the conference session was provided by Atari, Incorporated, A-VIDD Electronics, Bell & Howell, Fisher Scientific Company, Franklin Computer Corporation, IBM Corporation, Micro-Pro International Corporation, Radio Shack, and Wabash Apple, Incorporated. Presentors and attendees alike appreciate the important of such support and its enhancement of the learning process.

Ed•Com '82's dedication to providing educators with the tools necessary to understand and meet the challenge of computers in education will continue with Ed•Com/Spring '83 being held in Washington, D.C. April 28-30, 1983.

**Circle No. 398 on Inquiry Card**



T.H.E. Journal Publisher Edward Warnshuis introduces Editor-in-Chief Dr. Sylvia Chorp as featured speaker at Ed•Com '82.



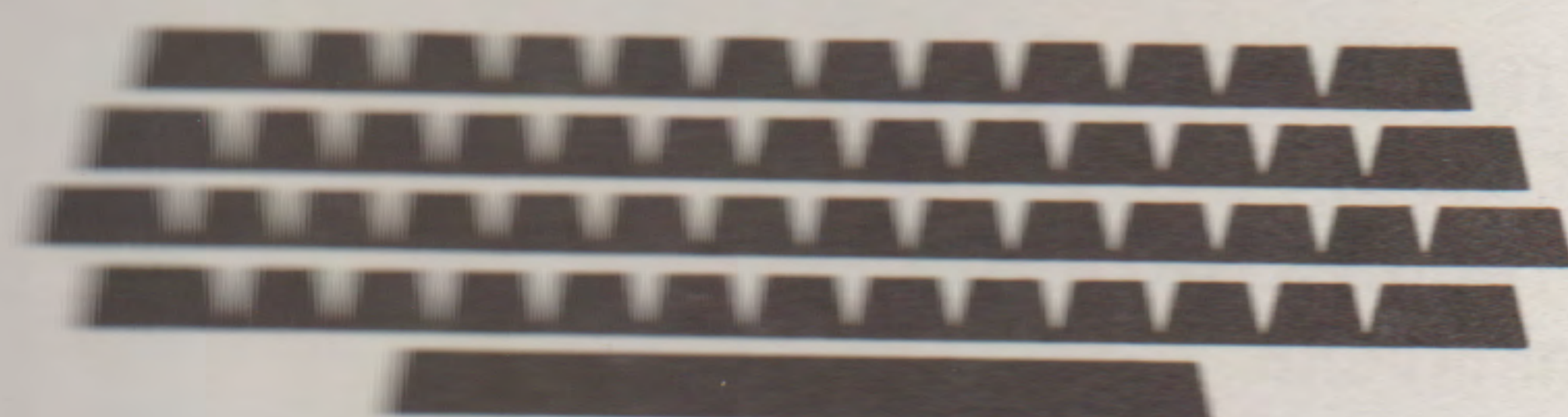
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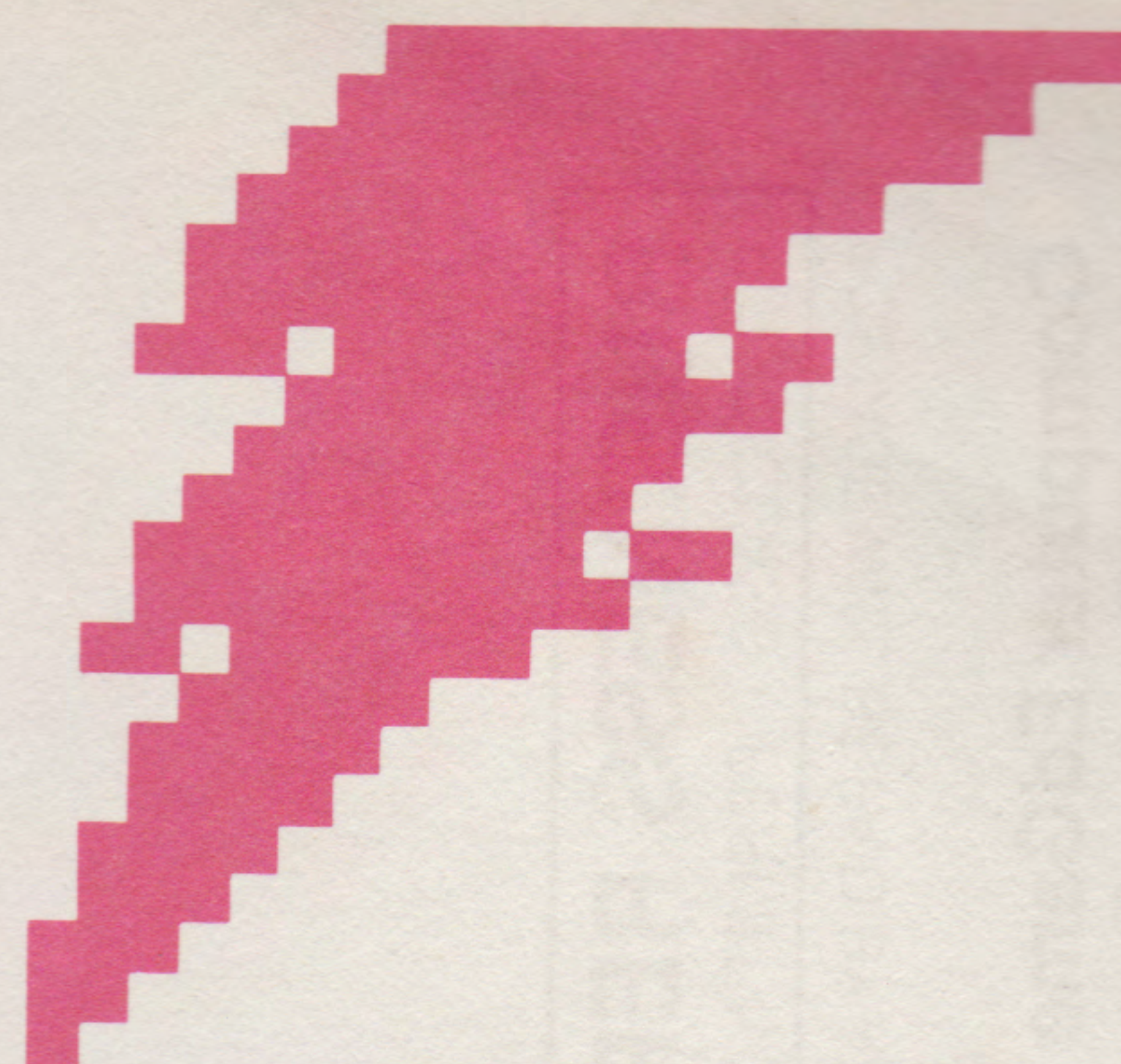


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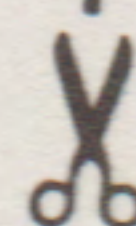
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Design an educational game on most popular microcomputers for elementary, secondary or post-secondary school use in any subject area.

It's simple to enter, **FREE**, and there are big prizes to be won. Even **royalties** if your entry is selected and distributed worldwide by contest organizers.

**AND**, most important—this is a non-profit endeavor. Winning programs will be offered to educators at cost.

Act now! Fill out and mail the attached card for more details. Remember, the first 2,500 entrants each receive two free Verbatim Datalife® minidisks.

Contest opens January 1 and closes March 31, 1983. For details, call (1)\* 800 + 221-4052.

\*If required in your local dialing area.

The Computer EdGame Challenge is sponsored by Verbatim Corporation in association with two leaders in educational computing, CONDUIT and MicroSFT.

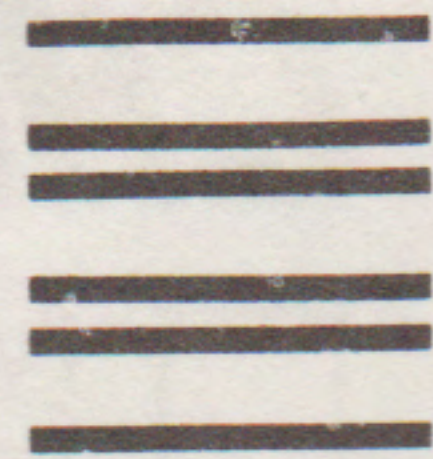
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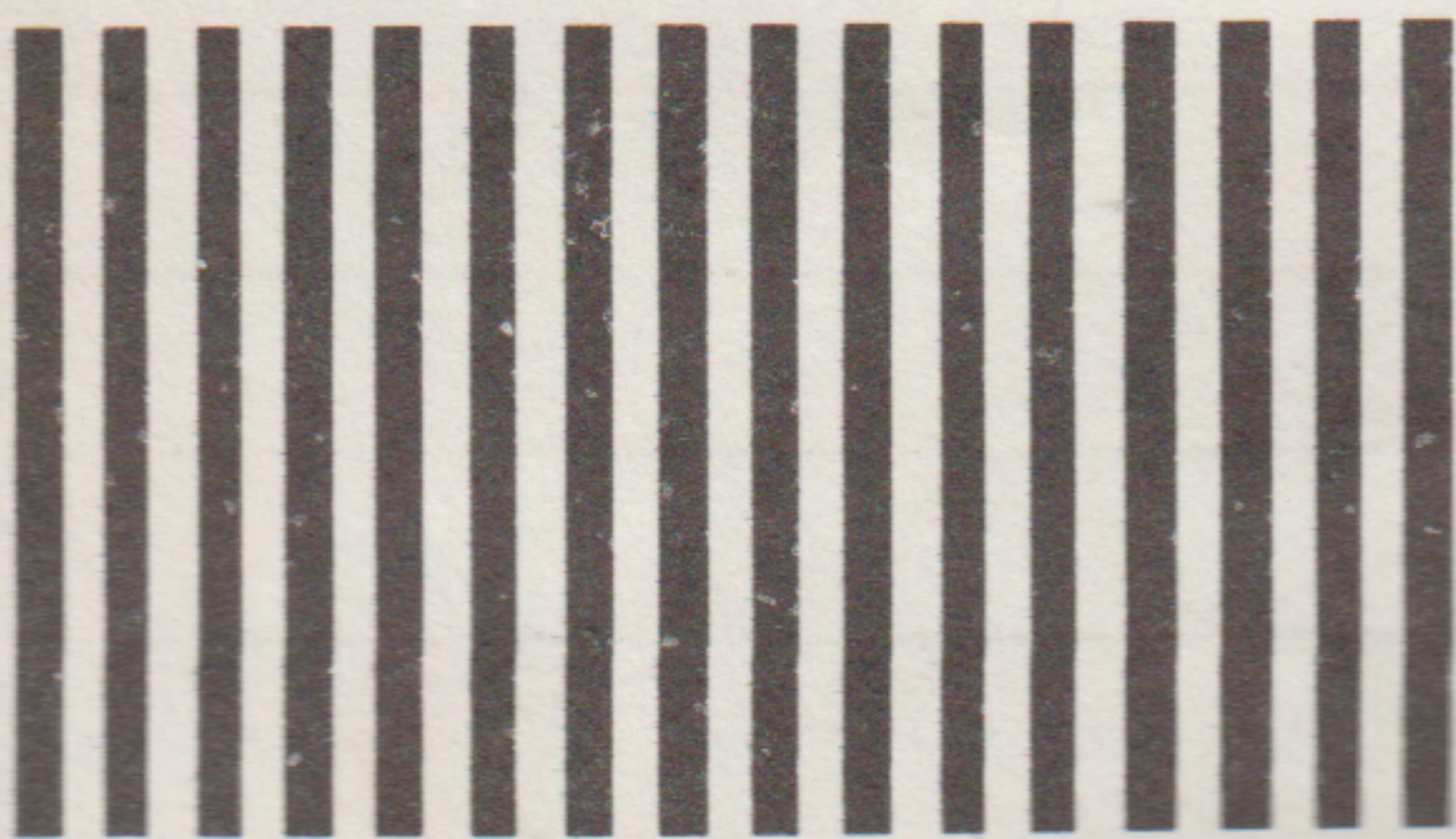
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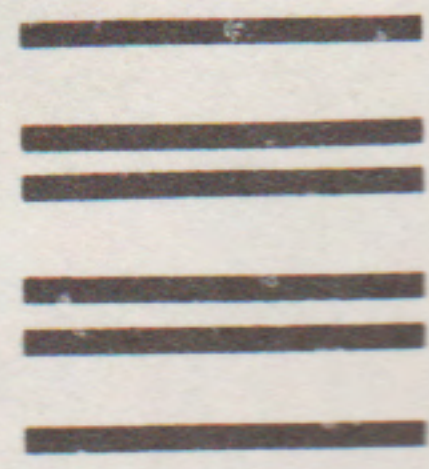
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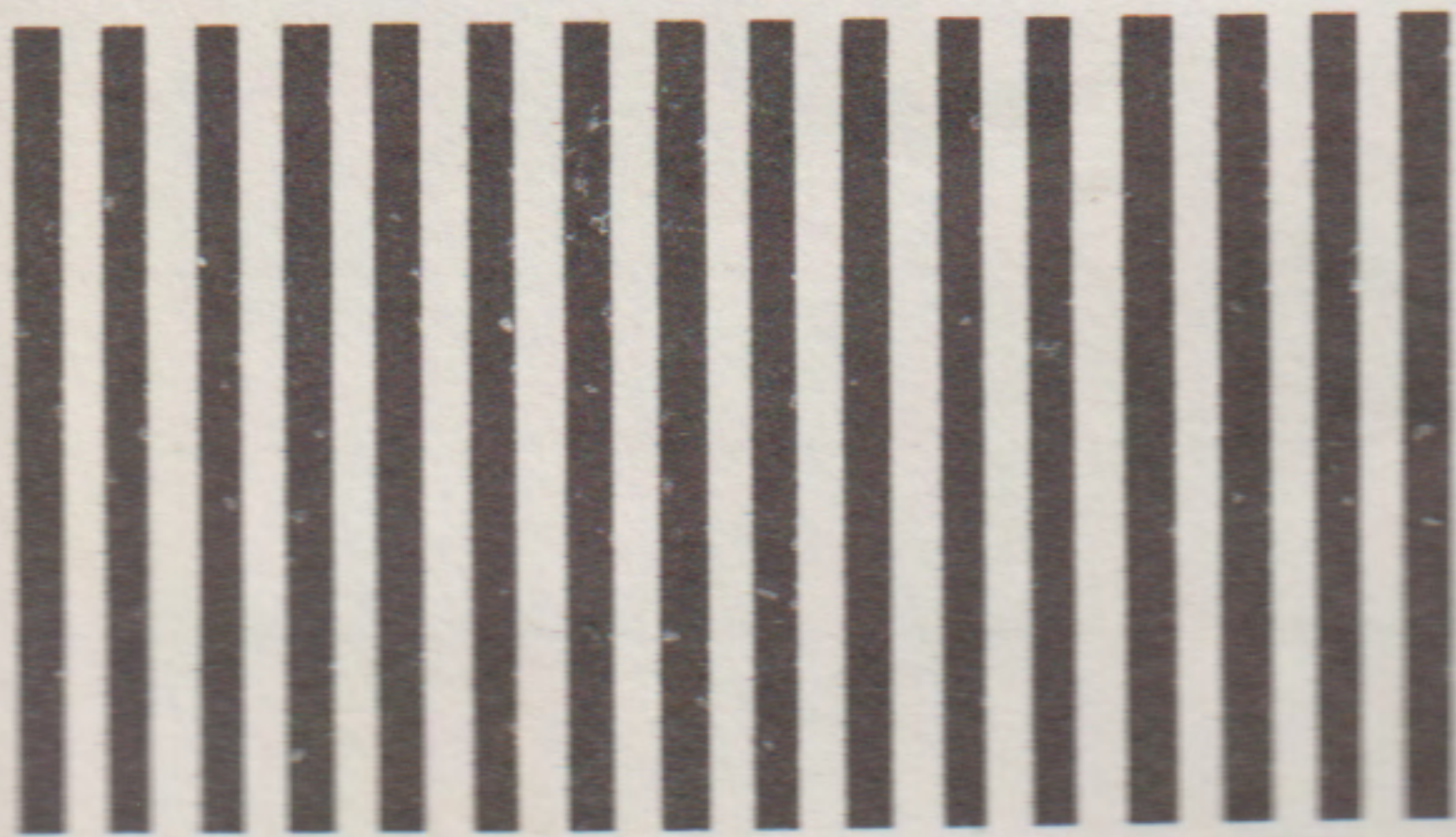
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It's simple to enter, **FREE**, and there are big prizes to be won. Even **royalties** if your entry is selected and distributed worldwide by contest organizers.

**AND**, most important—this is a non-profit endeavor. Winning programs will be offered to educators at cost.

Act now! Fill out and mail the attached card for more details. Remember, the first 2,500 entrants each receive two free Verbatim Datalife® minidisks.

Contest opens January 1 and closes March 31, 1983. For details, call (1)\* 800 + 221-4052.

\*If required in your local dialing area.

The Computer EdGame Challenge is sponsored by **Verbatim Corporation** in association with two leaders in educational computing, CONDUIT and MicroSIFT.

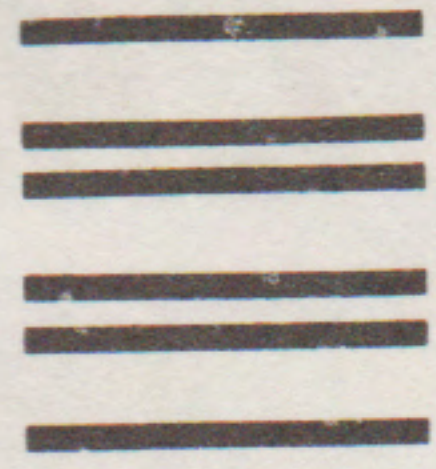
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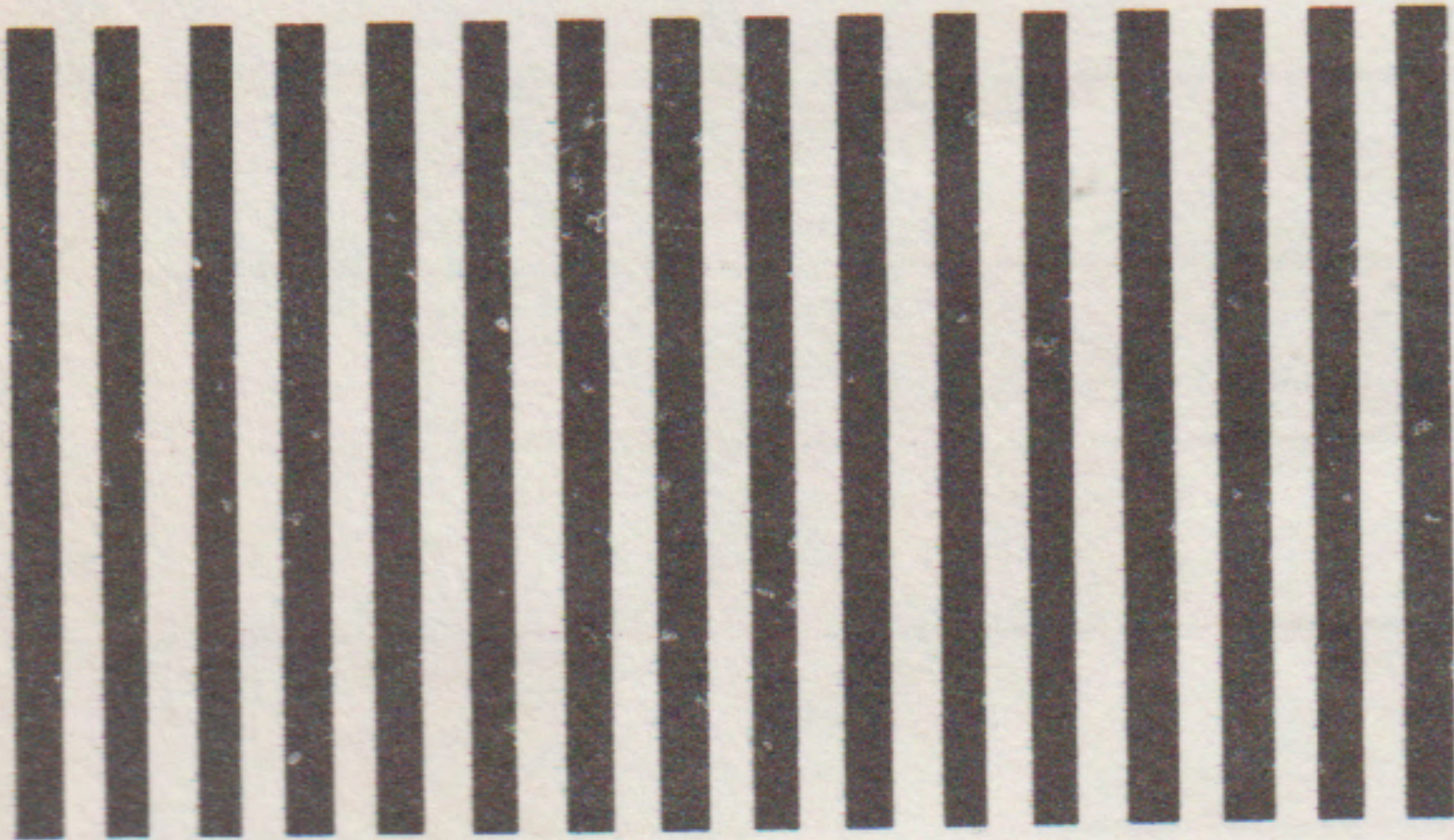
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## Computer Educational Games Contest To Be Held

**A**n innovative contest, the Computer EdGame Challenge, sponsored by Verbatim Corporation, as a public service to advance students' knowledge of computer technology, will be launched inter-nationally in January.

The three-month competition to develop high quality educational software that is informative, imaginative, entertaining and non-violent for use at all levels of learning, is open to teachers, professionals or students. It will be administered by two leading organizations in educational computing, CONDUIT and MicroSIFT.

We believe the appeal and popularity of electronic games can be channeled in a practical, constructive way in the educational field," notes Judy Edwards Allen, director, computer technology program at MicroSIFT

and specialist in K-12 education at the Northwest Regional Educational Laboratory.

"Our experience has shown there is desperate need for quality, computer-based teaching tools and this demand is only going to increase as computer systems proliferate throughout the educational sector.

There will be three educational levels: elementary, secondary and postsecondary. All entries must be submitted on a 5¼-inch minidisk or data cassette and designed on any one of a number of popular microcomputers currently used extensively in educational systems throughout the world. These include Apple, Atari, Commodore, IBM, Texas Instruments, Tandy and Sinclair.

A unique feature of the Computer EdGame Challenge will be the duplication of disks containing the best entries for distribution after the contest closes. "Verbatim's role as sponsor gives us the opportunity to make these award-winning educational

games available at extremely low cost (\$3.50) at the end of the program," notes Peters of CONDUIT.

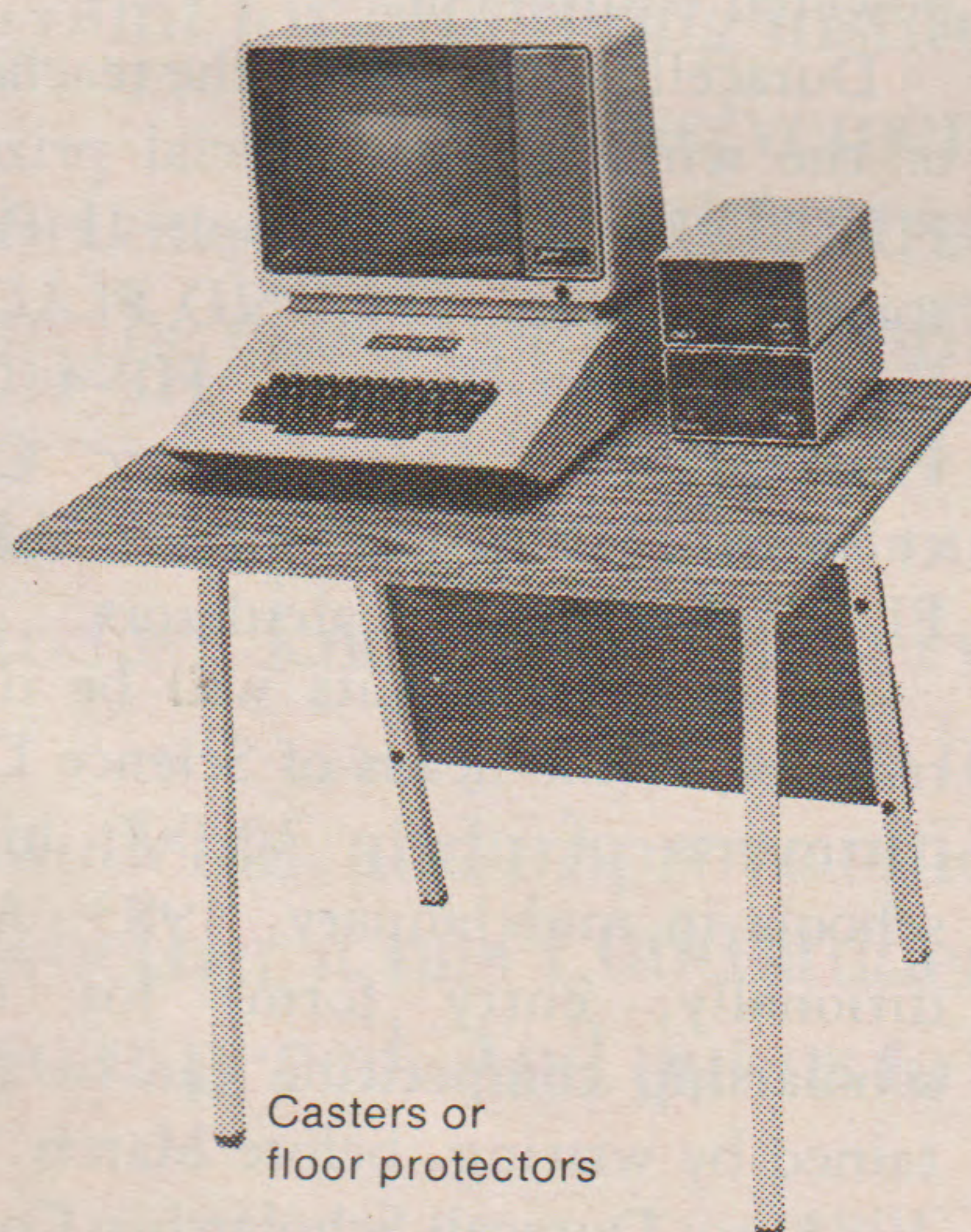
Information and contest pamphlets containing details about entry requirements, rules, categories, judging criteria and guidelines for game authoring, can be obtained by calling toll-free 800-221-4052, or by filling out a card at Computerland store. Send written requests to Computer EdGame Challenge, 4966 El Camino Real, Los Altos, CA 92022.

## North Star Announces Leasing Option For End-Users

**P**rospective users of North Star ADVANTAGE and HORIZON microcomputers now have the option of leasing the systems from participating dealers, North Star Computers, Inc.

## FIGHT THE BUDGET SQUEEZE!! WITH DELTA MULTI-USE TABLES!

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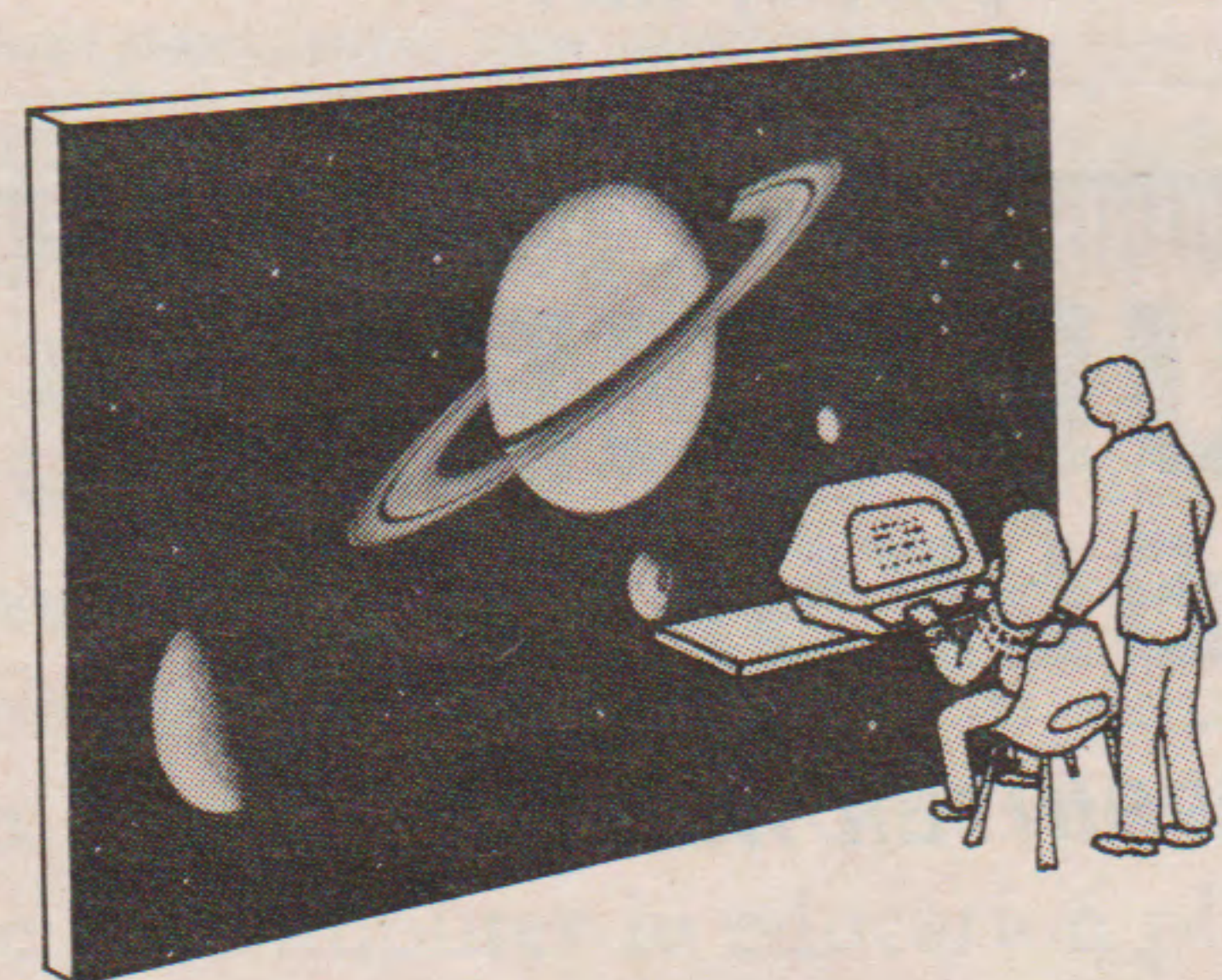
T.H.E. JOURNAL 21



Through a cooperative venture between North Star and U.S. Leasing, three- to five- year leases are available to potential users in the United States, according to Elliot Wassarman, North Star's vice president of marketing.

"A potential North Star computer systems buyer now has a choice of an outright purchase of a system or a leasing arrangement, depending on what makes more sense in the particular financial situation," Wassarman explained. "With a leasing arrangement a business person can gain maximum use of his or her capital as well as tax savings, such as investment tax credit and expense deduction."

"We selected U.S. Leasing, the largest leasing company in the United States, because of their ability to be responsive to dealers and end-users, their excellent reputation and their knowledge of business computer leasing," he said.



## SPACE MURAL

Enhance your computer resource center economically with a FULL-COLOR photographic wall mural. You will highlight your learning center... and stimulate your students with high tech graphics.

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\*Saturn mural shown above—Brochure mailed on request.

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**Circle No. 6 on Inquiry Card**

ing," he said. "In addition, their Advantage Lease Package allows system upgrades under the lease as the user's requirements increase."

**Circle No. 385 on Inquiry Card**

## Duracell Announces National Scholarship Competition

**D**uracell Inc., the manufacturer of DURACELL® batteries, announced a nationwide \$30,000 scholarship competition and the development of a special educational program designed for high school science classes.

The Duracell Scholarship Competition and classroom materials are intended to encourage scientific creativity among the nation's high school students and are endorsed by the National Science Teachers Association.

The scholarship competition, to be held in 1983, is open to all students grades 9 through 12. In the competition, contestants will design and build battery-powered devices that provide practical functions, such as to entertain, amuse, make life easier, serve as a warning device, provide sound or light or both. The devices must be powered by one or more DURACELL® AAA, AA, D, C, 9-volt or lantern batteries.

To enter, each contestant must submit a color photograph and one-page description of his or her device along with an official entry form by April 6, 1983. The 100 finalists, chosen by the National Science Teachers Association, must send their devices to the Museum of Science and Industry in Chicago for the final judging. The names of the forty-one winners will be announced on May 25, 1983. The prizes are: **FIRST PLACE:** One \$10,000 College Scholarship, plus trip to Chicago for the winner, his or her teacher and parents or guardians. **SECOND PLACE:** Five \$3,000 College Scholarships, plus trip to Chicago for the winners, their teachers and one of his or her parents or guardians. **THIRD PLACE:** Ten \$500 College Scholarships. **FOURTH PLACE:** Twenty-five \$100 gift certificates for battery-powered equipment.

Duracell is also giving the teachers of the winners these special prizes: **FIRST PLACE:** One Apple II Personal Computer. **SECOND PLACE:** Five Hewlett-Packard HP-41C Programmable Alphanumeric Calculators. **THIRD PLACE:** Ten Sharp EL-5100 Scientific Calculators.

The Education Kits will be distributed to the heads of Science Departments of nearly 10,000 high schools in mid-January, 1983. Additionally, entry forms for the scholarship competition can be obtained by writing, before March 16, 1983, to: Duracell Scholarship Competition, c/o Burson-Marsteller, 800 Third Avenue, New York, New York 10022.



# The little computers that are

(a) able to teach students about computers.

(b) proven vocational training tools.

(c) administrative tools to help run a school.

(d) all of the above.

If the little computers are IBM's, the answer is (d). Because we have several little computers that can do big, important things.



Little IBM computers can teach students what a computer is, how it works, and how it fits into society. And they can teach highly marketable vocational skills as well. From word processing and office systems, to actual computer operation and programming.

They can also be a big help as a teaching aid in meaningful drills that involve students, while the teacher devotes the time to one-on-one instruction.

Administrators of elementary and secondary schools, as well as post-secondary vocational schools, can use a little IBM computer. Start off with financial applications, like payroll and budgets; then add attendance, grade reporting and others, later. This growth protects your investment, which is surprisingly small to start with. And to make little IBM computers even less expensive, we offer a 15 percent educational discount for qualifying institutions and eligible equipment.

Our involvement with education goes back to the 1950's when IBM typewriters became the byword for teaching typing. And whether you use a little IBM computer in the classroom or the office, there are programs to get things going quickly and easily.

Of course, IBM support is there, wherever you are. From education centers to help you get the most out of your little computer, to fast, knowledgeable service when it's needed.

If you'd like to help your teachers and students, and improve efficiency in your district—whether it has 1,000 students or 10,000—pick up your pencil. And put us to the test.



Circle No. 12 on Inquiry Card

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TJ-1-83

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Phone \_\_\_\_\_

I'd like to use your little computers for \_\_\_\_\_

\_\_\_\_\_





# FROM MINNEAPOLIS

**School systems everywhere are discovering that the value of ATARI computers adds up quickly.**

When you compare how much ATARI classroom computers can do, and how little they cost, you'll appreciate why more and more school systems nationwide are putting ATARI computers at the head of the class.

Read on and discover why four widely-separated school districts, with varying needs, all recently chose ATARI computers over the competition.

**Minnesota discovered that the capability and compatibility of ATARI computers go hand in hand.**

The Minnesota Educational Computing Consortium (MECC) was the first statewide educational computing organization to use computers. After experience with some 2,800 classroom computers, MECC determined that ATARI computers could meet many of their needs at a much lower cost. They were able to convert a significant portion of their existing software to the ATARI computer system. MECC expects

the ATARI 400 computer systems with the ATARI 810 disk drives to make a big difference in Minnesota, and MECC is continuing to invest in ATARI for the future.

**It made sense to start with ATARI computers in Dade County, Florida.**

In Florida, Dade County Public Schools wanted to initiate a computer literacy, computer-assisted instruction program for elementary through high school levels, but hold down costs. The best computer value, from both a hardware and software point-of-view, was imperative. After a painstaking evaluation of 12 different computer systems, Dade County chose ATARI 800 classroom computers, ATARI 810 disk drives and ATARI software. They were convinced that ATARI computers gave the best combination of capability and value.

**Good all-round value with specific application advantages. That's why Fairfax County in Virginia chose ATARI computers.**

The exceptional capability and value of ATARI





# TO MIAMI ATARI COMPUTERS ARE GOING TO THE HEAD OF THE CLASS.

computers also met a need for the Fairfax County Public Schools in Virginia. They, too, wanted the best overall computer value from both a hardware and software standpoint, and after investigating the alternatives, decided upon ATARI 800 computers and ATARI 810 disk drives. Fairfax County was particularly impressed with the ATARI 800 computer system's screen editing capability, along with its color graphics and sound, for the development of computer literacy software. The ATARI PILOT language is being considered for introducing programming experiences to both teachers and students in grades K-8.

**In Cupertino, California, they know a good computer when they see one.**

When you're located in the heartland of the California computer industry, as the Cupertino Public School System is, you know you can choose from the best classroom computers available. Last fall, when it came time to add to its computer literacy and computer-assisted instruction

program, Cupertino chose ATARI classroom computers. They purchased ATARI 800 computers and ATARI 810 disk drives because they felt ATARI offered the best overall capacity for the money. They were also excited by how ATARI Microsoft Basic and the ATARI PILOT language helped solve software needs. An added bonus was the ATARI Program Exchange where the school system could obtain additional innovative software on a regular basis.

**ATARI is at the head of the class.**

We could go on, as the ATARI computer educational success stories continue to roll in. But we'd rather you had the chance to see for yourself what ATARI computers can do for your schools. To begin your own success story, simply write to:  
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**Circle No. 5 on Inquiry Card**



# Product Profile

## Complete Robotics Education and Training Includes Teaching Robot

**T**he Heath Hero I robot and course make it possible for nearly any school to buy the equipment and materials necessary to set up a comprehensive robotics education program.

Increased productivity and quality are top priorities of American industry today, and increasingly, U.S. manufacturers are turning to industrial robots to help achieve these goals. This, in turn, is creating a growing demand for engineers, designers, technicians and workers who understand how to apply and maintain modern industrial robots.

The robot actually evolved along with Heath's efforts to develop a low-cost trainer to be used with an industrial electronics education course. Both education and training institutions need "hands-on" experimentation to reinforce the learning experience. The robot incorporates many of the basic elements of industrial electronics, like motors and generators, servos and steppers and solenoids, relays and programmable controllers and so forth. Further, it provides exposure to many disciplines that have broad industrial application; basic principles of industrial electronics, computers, automated equipment, electromechanical devices, programmable controllers, sensors and artificial intelligence.

It is a completely self-contained, electromechanical robot capable of interacting with its environment. It is controlled by its own on-board, programmable computer and carries electronic sensors to detect light, sound, motion and obstructions in its

path. It can be programmed to pick up small objects with its arm, speak complete words and sentences with its voice synthesizer, travel over predetermined courses and repeat specific functions on a predetermined schedule. It carries its own rechargeable power supply and can function totally free of any external control.

The operator gains practical, hands-on experience with the basic elements of robotics, such as programming, electronically-controlled drive and positioning, interfacing and data acquisition.

### Senses

**Sound:** Detects and quantifies ambient sound levels over the frequency range of 200 to 5000 Hz. Resolution is 1 part in 256. The sound sensor is approximately omnidirectional.

**Light:** Detects and quantifies ambient light levels over the visible spectrum. Resolution is 1 part in 256. Sensor beam angle is approximately 30 degrees.

**Ultrasonic Ranging:** Pulsed ultrasonic system. Maximum range is 8 feet (2.4 meters). Range resolution is .42 inches (1 centimeter). Horizontal and vertical beam width are each approximately 30 degrees. Transmit frequency is approximately 35 kHz.

**Motion:** Detects motion about it using a continuous wave ultrasonic system. Sensitivity depends on the size and relative movement of the object detected. Will detect an average-sized adult walking toward

the sensor at a distance of 15 feet. If the sensor is pointed toward a wall, motion detection is approximately omnidirectional.

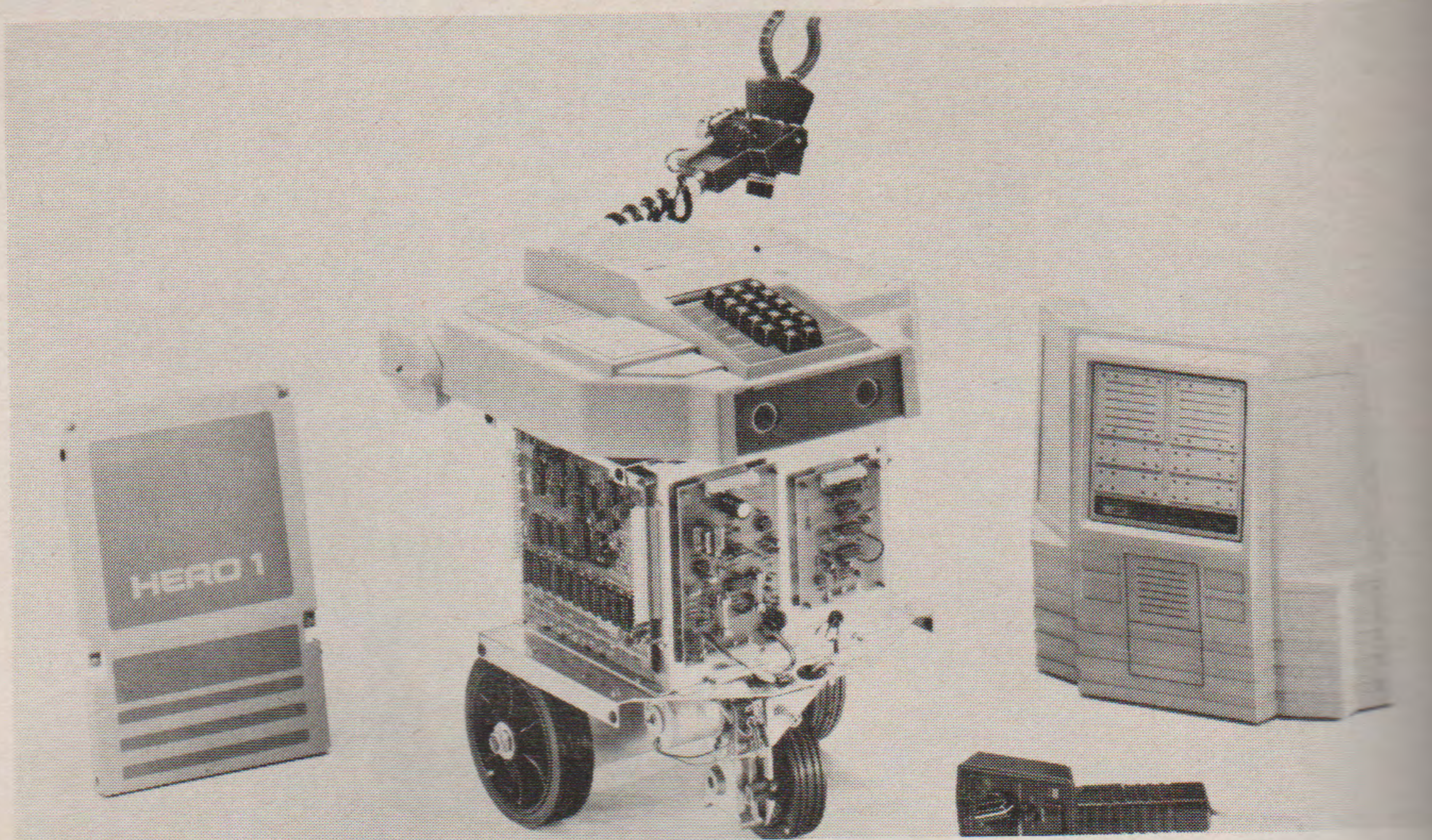
**Speech:** Synthesized phoneme-based system. Generates 64 phonemes (basic sounds) which can be linked together in any combination to simulate human speech or various sound effects. Reference pitch is hardware selectable, and instantaneously variable over four levels of inflection using software.

**Time:** Hardware four-year calendar clock. Counts seconds, minutes, hours, day of week, day of month, month of year. Accuracy after initial setup is plus or minus 120 seconds per year.

The Robotics Education Course provides a comprehensive grounding in robot technology, essential for those seeking to begin a career in the expanding field or to upgrade technical skills to include robotics. Although designed to be used in conjunction with the Hero I Robot, the course is fully functional without it.

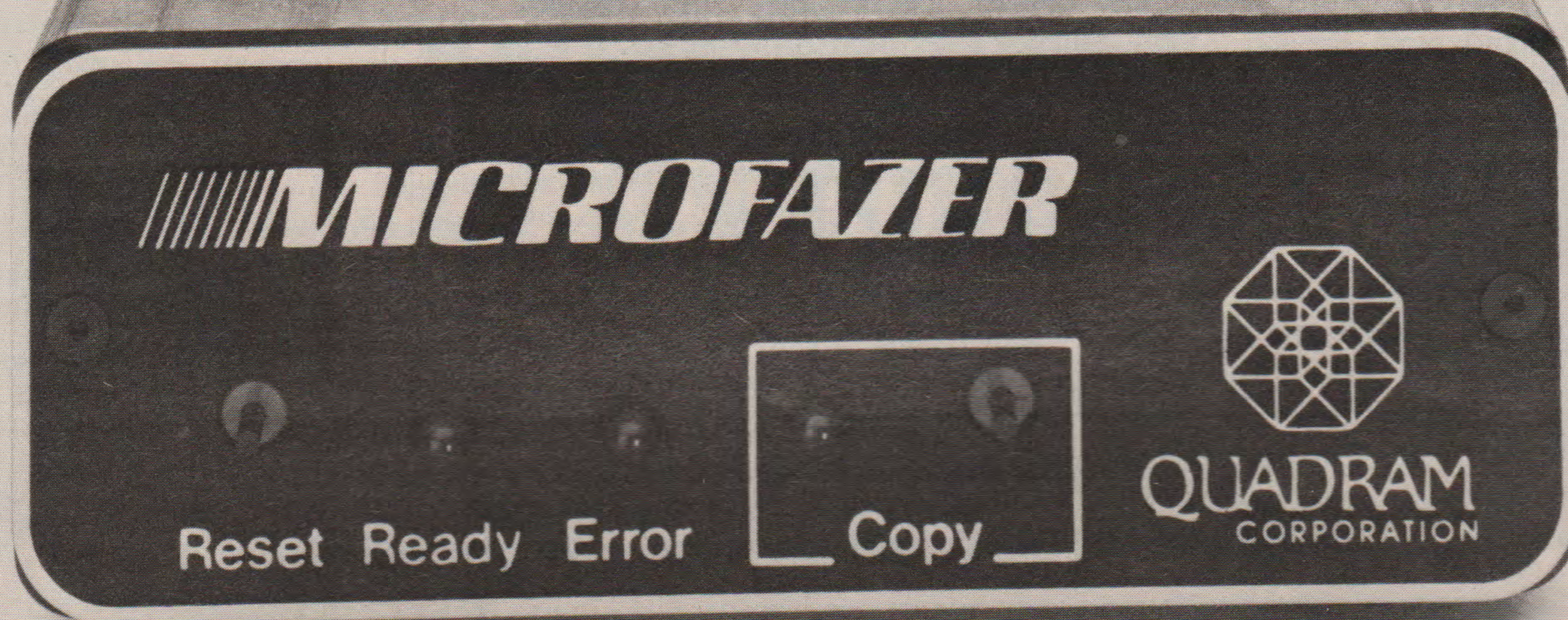
The 1200-page program is divided into eleven teaching units: Robot Fundamentals; Alternating Current and Fluidic Power; Direct Current Power and Positioning; Microprocessor Fundamentals; Programming; The Heath Robot Microprocessor; Data Acquisition (sensors); Data Handling and Conversion; Voice Synthesis; Interfacing; and Industrial Robots at Work.

**Circle No. 397 on Inquiry Card**





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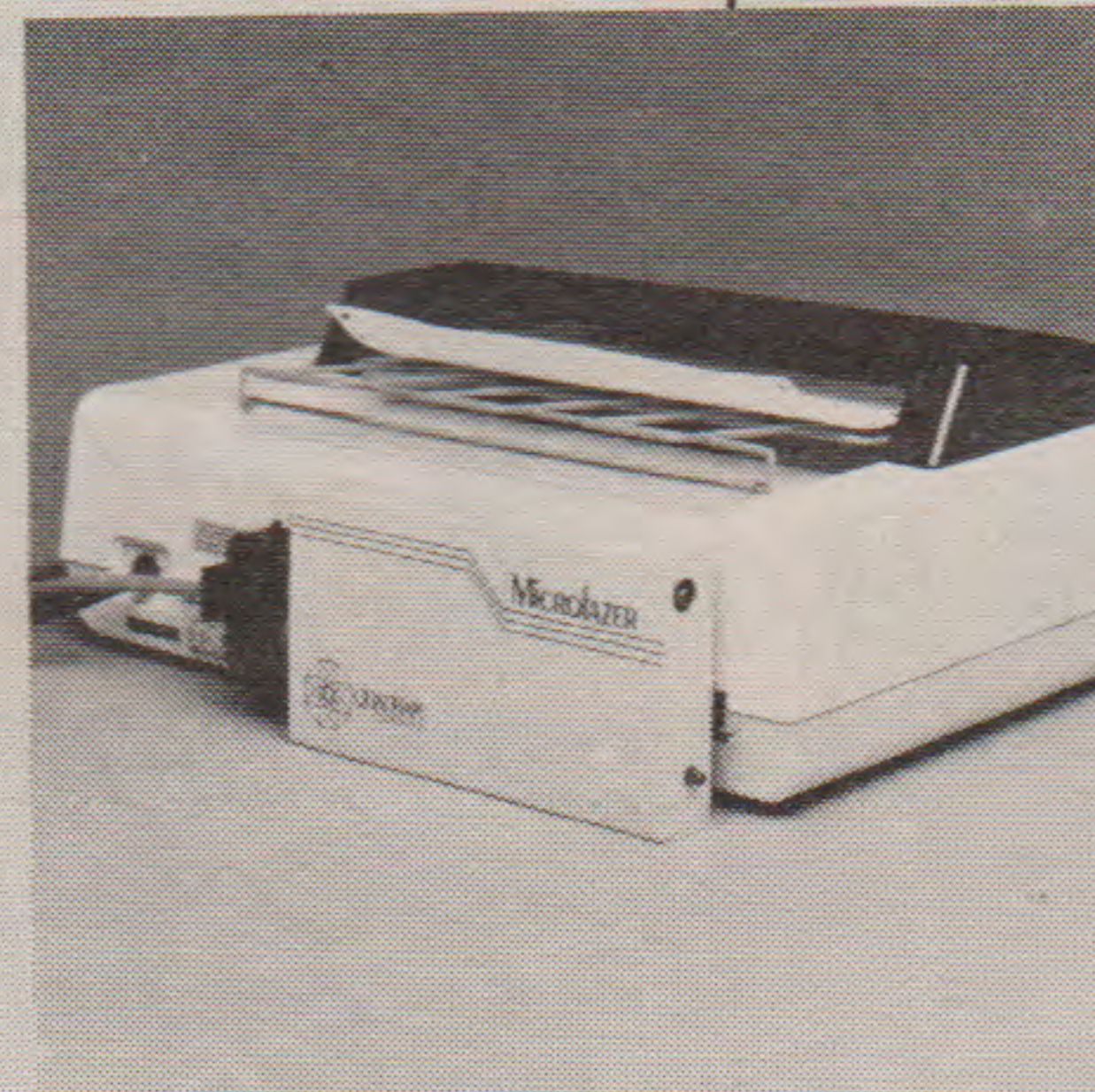
**Time is money.** You have a computer system because you know that it saves you money by simplifying procedures and reducing time normally involved in your work. Time is an important resource which should not be wasted. You are wasting valuable time if you ever wait for your printer.

**No waiting.** Now with Microfazer by Quadram there is no more waiting.

Microfazers are inexpensive universal printer buffers which any computer user cannot afford to be without. Any computer—any printer (or plotter!), whether parallel or serial. Microfazer receives information from the computer at ultra high speeds causing the computer to think the printer is printing just as fast as the computer can send. Microfazer holds the information until your printer can handle it, and then sends it on.



**More copies.** Microfazer is equipped with a copy feature allowing additional copies of the buffered information—from one to as many as you want—with the mere press of a button. When you



need your information repeated, for whatever reason, it's always right there—inside Microfazer.

**Microfazer™ stack.** Microfazer can be stacked with popular modems or other peripherals. Some models can plug directly onto the back of your printer. Install it in less than 60 seconds, and choose the amount of buffer

memory you need—8K, 16K, 32K, or 64K. One model even comes with up to 512K! You may use several Microfazers in series to create just what's right for you.

Take data in from a serial computer and out to a parallel printer. Or in from a parallel computer and out to a serial printer. Microfazer is just as flexible as you need it to be.

**Low price.** Only \$169 for 8K of buffering, \$189 (16K), \$225 (32K) and \$299 for a full 64K. Serial-to-Parallel, Parallel-to-Serial and

Serial-to-Serial models have slightly higher prices.

  
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**Circle No. 22 on Inquiry Card**



# New Publications

## Free Microcomputer Educational Programs Catalog:

Individual programs and program series are now available in this 14-page color catalog. It features nine single-diskette programs, previously offered only in program series. Presenting individualized instruction in basic living skills, the programs are recommended for home economics, vocational education, basic math and special education curricula.

Individual programs from the Everyday Math Series include The Problem Solving Process, Solving Addition & Multiplication Problems, Solving Subtraction & Division Problems and Solving Multiple-Step Prob-

lems. All programs feature flexible branching to as many as four different reading and concept comprehension levels, color graphics, a comprehensive guide and worksheets designed to reinforce learning. (Individual programs are priced at \$44.95 each.) MCE, Inc., Kalamazoo, MI.

**Circle No. 111 on Inquiry Card**

## New Technology in Tomorrow's Education:

Copies of 122 technical papers presented at the May 1982 convention sponsored by the Association for Educational Data Systems are now available. Topics included are: Big Problem — Student Scheduling and Grade Reporting, Big Solution — The Microcomputer; Computer aided instruction at all levels of education; Computer literacy training curriculum structure and courseware development and evaluation; Computer applications in edu-

cational administration — to computerize or not; and Computer planning over a long range. (\$17.00) AEDS 1982 Proceedings, Washington. **Circle No. 121 on Inquiry Card**

## Audiovisual Equipment and Supplies Catalog:

This free catalog is ideal for media specialists, training and development professional and hobbyists.

This latest catalog includes an expanded microcomputer and micrographic section featuring the latest in computer software, workstations and seating, computer literacy guides, diskettes and computer paper, along with microfiche and film equipment and accessories.

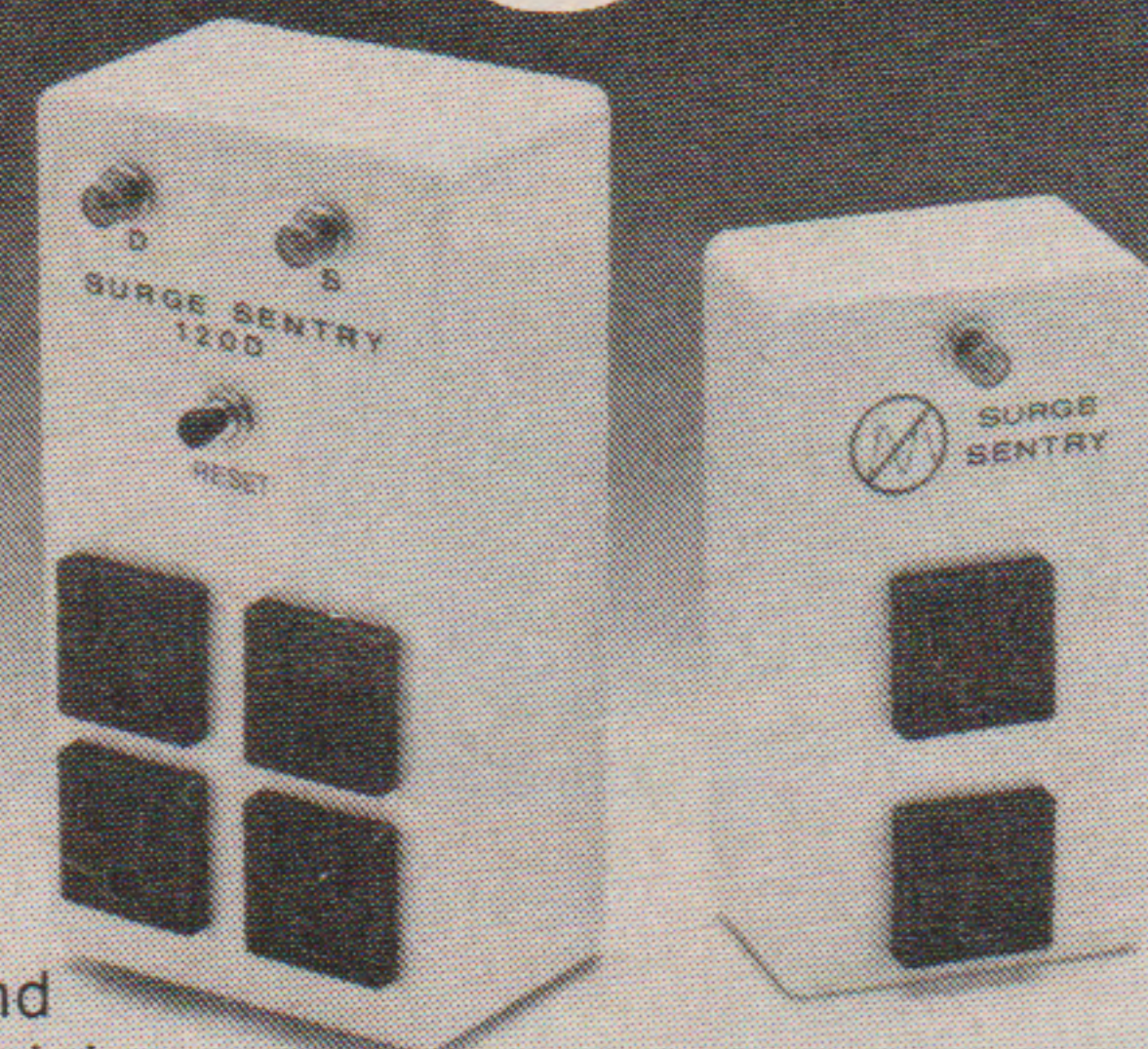


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**Problem Solving and Structured  
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Frank L. Friedman and Elliott B.  
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Koffman, both of Temple University  
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Tutorial audiocassettes supplement the text to provide dictation, pacing, and timing activities. Tutorial diskettes are also available for the Apple II Plus® and TRS-80 Model III™ microcomputers and present the first 30 lessons in the text.

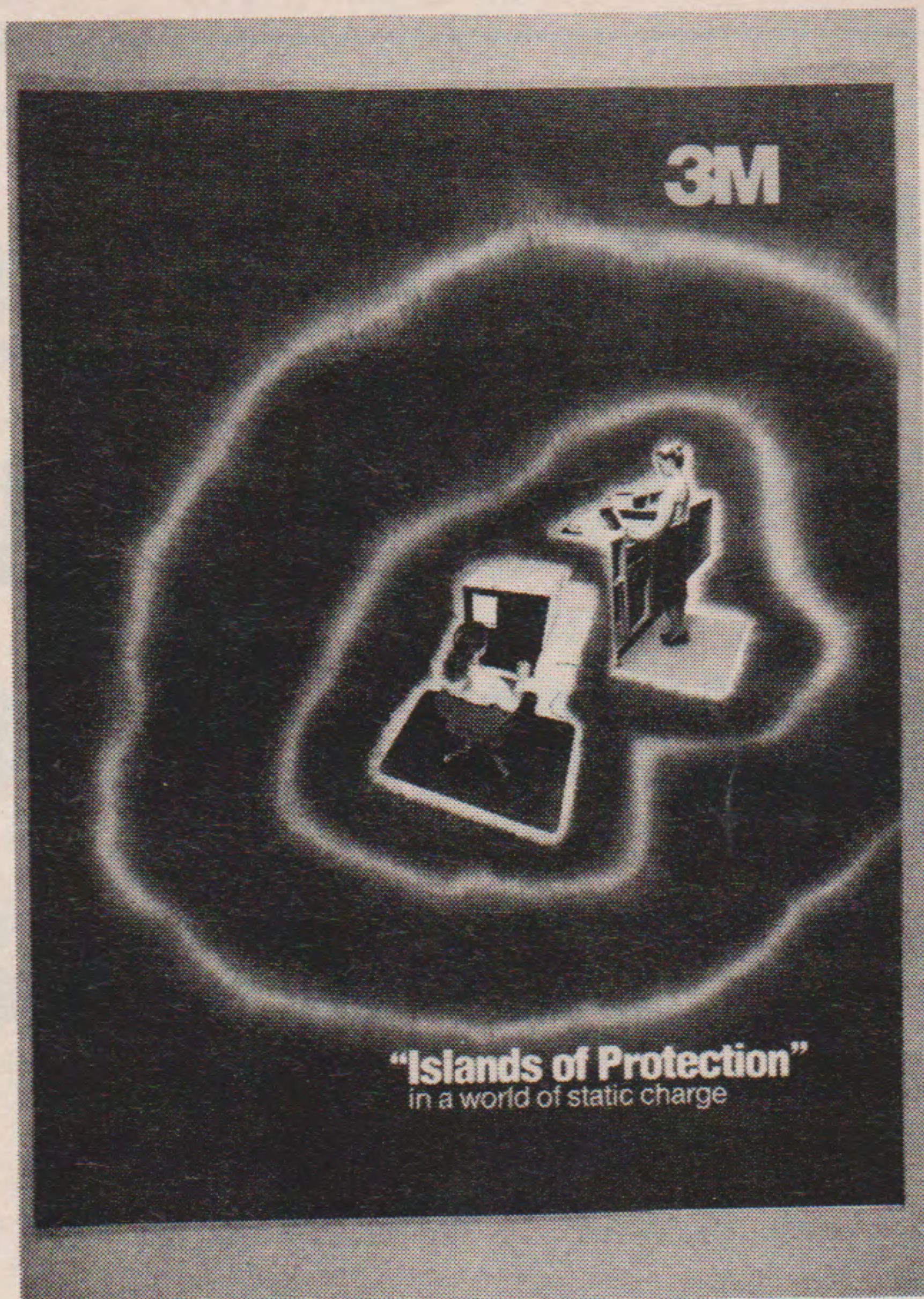
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### Free Static-Problem Solutions Literature:

By simply walking across a room, a person can build up a charge of 4,000 to 12,000 volts; as small a charge as 500 volts can cause equipment malfunctions. "Islands of Protection," a four-page bulletin, describes the protection of computer terminals, electronic cash registers and other electronic data and word-processing equipment from operator-generated static charges through the use of 3M Static Control Floor Mats. 3M, St. Paul, MN.

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### Diagnostic Software/Reading:

A flyer introducing PAL, a truly diagnostic/remediation system which actually diagnoses the cause of reading problem and then provides remediation directly targeted at those problems, is being made available. It covers the entire scope and sequence of reading education for each grade 2 through 6 and evaluates the students' reading ability in up to 40 major skills and 160 subskills for each grade level. All the grade level materials are brightly color-coded so that disks and instructions from different levels won't be mixed together by students. Universal Systems for Education, Inc., Colorado Springs, CO.

**Circle No. 150 on Inquiry Card**

**Free Educational Software Catalogs:** Available for grades K-9 and high school/ college level, these catalogs list educational software for Apple, Pet, TRS-80 and Atari computers. Each contains several hundred programs from a wide variety of publishers. Queue, Inc., Fairfield, CT.  
**Circle No. 113 on Inquiry Card**

### Freeloader 500 Software Library:

It is a collection of over 2500 programs for the Apple computer, categorized by subject and packaged for easy use. This is not a bibliography of software but a compilation of public domain software, on diskettes, which can be loaded into the Apple computer.

The programs come in seven loose-leaf binders, each binder containing 7 to 10 diskettes recorded on both sides. Indexes to the programs are also included. The seven subject categories are: Business and Finance, Utilities, Graphics and Sound, Education, Home, Games and Adventures.

The complete software library is offered for \$500.00 and includes all seven binders listed above. In addition, seven sourcebooks (paper copy source listings for programs) are included, one for each subject. Subject modules may be purchased individually. Binders are available for \$75.00 each and sourcebooks may also be purchased separately for \$20.00 each. American Software Publishing Co., Washington, DC.

**Circle No. 122 on Inquiry Card**

### Science & Math Teachers Microcomputer Products:

A new supplement to this catalog is now available. This 10-page brochure describes new and exciting software and hardware for all types of microcomputers. Listed are software tools, simulations and tutorials. Cambridge Development Laboratory, Watertown, MA.

**Circle No. 118 on Inquiry Card**



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Circle No. 24 on Inquiry Card



**Courseware Catalog:** This 18-page color brochure lists materials for grades K to 12 in the following categories: Games (Math), Grammar Problems, Language Arts, Mathematics, Reading and Writing Skills. Each package contains a teacher's guide that provides comprehensive documentation of the curriculum as well as an overview of the design of the courseware. Operating instructions and suggestions for implementing the programs in a school system are easy to follow. Three new programs have been added: Sentence combining, Cloze Plus and Edufun! Learning games. *Milliken Publishing Co., St. Louis, MO.*

**Circle No. 126 on Inquiry Card**

**Microform Catalog:** Dozens of valuable new titles have been added to the periodicals section, and many more backfile years are being offered

in this catalog. It provides a vast array of information that is quickly and easily accessed. It is three catalogs in one. Section I contains products on microfilm, Section II products on microfiche and section III microform equipment. Each of these catalogs has been designed to meet specific needs. *Bell & Howell, Wooster, OH.*

**Circle No. 151 on Inquiry Card**

**Free Physics Programs Catalog:** Software programs for Apple II designed to teach introductory physics are described in this 14-page brochure. Students are allowed to experiment with situations which are difficult to arrange in the lab. Students are able to analyze experimental results. These programs help teachers accomplish a task which was very difficult or time consuming without a computer.

The programs are not copy protected to allow the option of modify-

ing the program to better suit the user's needs. All programs contain a user's guide for students, a teacher's manual with background information and suggestions for using the program in class, suggestions for modifications for specific purposes, a list of all variables used in the program and a listing of the Applesoft program, with notation explaining the program operation. *Vernier Software, Portland, OR.*

**Circle No. 139 on Inquiry Card**

**Computer Science Brochure:** An informative, 10-page booklet is being offered by DEC. Articles such as Sharing The (Computer) Wealth at Washington, Grinnel Gears Up For Expanded CS Activity, Passing The Buck, Computer Style and Hybrid Language Flowers At Queens are only some of the interesting items featured. *DEC, Maynard, MA.*

**Circle No. 153 on Inquiry Card**



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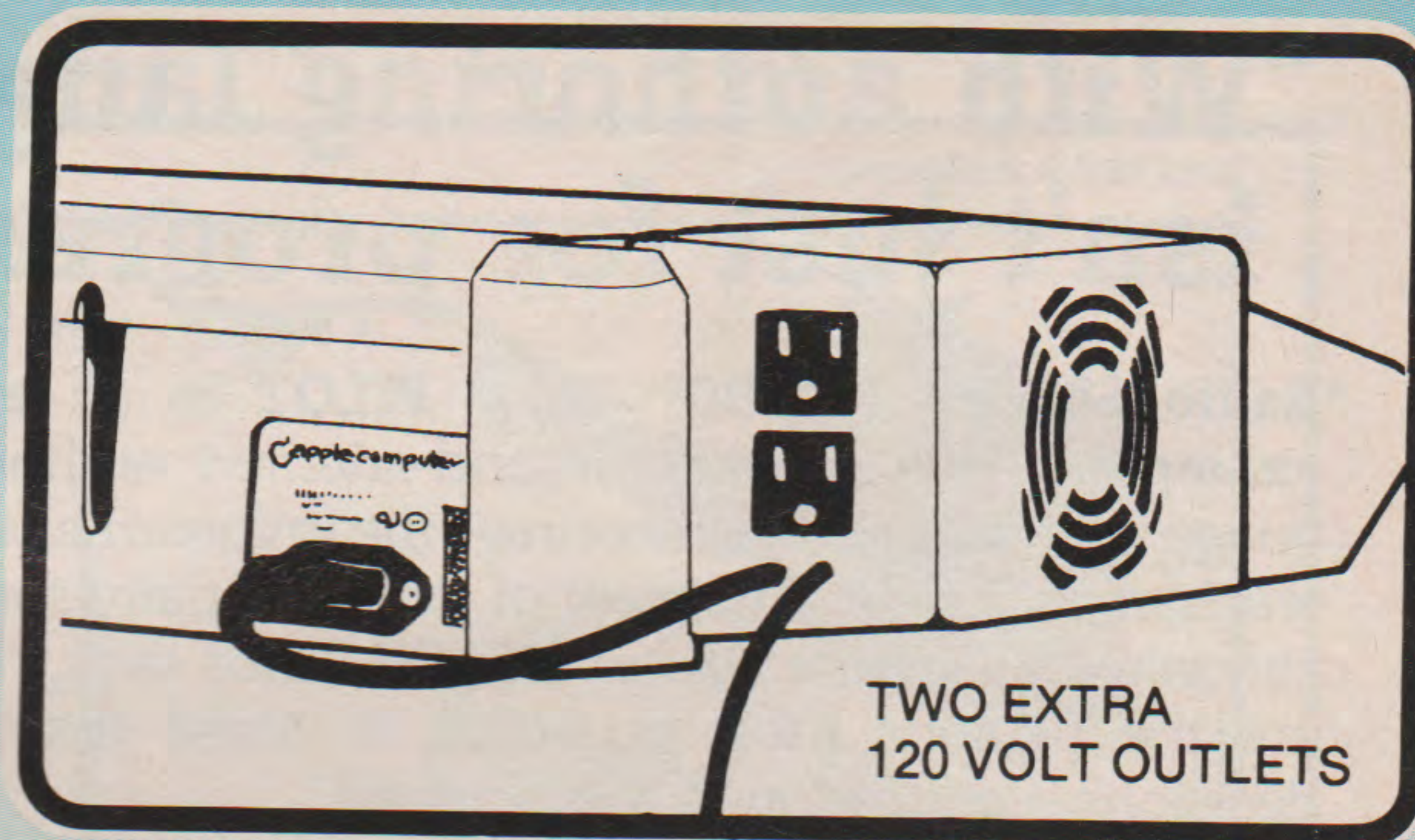
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**DEALER INQUIRIES INVITED**

Circle No. 25 on Inquiry Card





**"With authoring languages, software development isn't just for programmers anymore."** —Dr. Dan Gibbs, Consultant  
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**"Radio Shack's TRS-80® Color PILOT is an excellent example."** This new command-oriented authoring language was designed to encourage the involvement of more teachers in the development of instructionally-sound educational courseware. "After all," Dr. Gibbs says, "teachers are the persons most qualified to make instructional decisions—education is their career!"

**"A good authoring language must be easy to use,** yet flexible enough to allow educators to implement their varying instructional strategies. Color PILOT meets both of these requirements." It's based on PILOT, the computer language which has been widely used in education since the early '70's as a tool for CAI development. Color PILOT consists of twenty single-letter commands or statements and eight graphics commands, many of which can be further clarified by the addition of special one-character "modifiers". Reviewing the commands is as easy as reciting the alphabet!

**"Attractive, well-planned screen displays are essential in effective CAI programs."** With Color PILOT, many display options are available and on any given "frame" or screen display: upper- and lower-case characters, large and/or

small characters, user-generated characters, selection of colorset, including background and "pen" colors. And Color PILOT's built-in text and program-line editors make revision of a program quick and easy.

**"Additional advantages are Color PILOT's low price and availability in two versions."** Radio Shack's cassette version (Cat. No. 26-2709) is just \$59.95 and requires the low-cost TRS-80 16K Standard Color Computer. The disk version (Cat. No. 26-2710) is only \$79.95 and requires a 32K TRS-80 Color Computer with Extended BASIC and a Color Computer Disk Drive. With either version, you may use your own color TV. Both versions come with a complete step-by-step manual and a self-study course for writing your own programs.

**To see Color PILOT,** stop in at your nearest Radio Shack Computer Center, local store, or participating dealer. Or contact your nearest educational coordinator.

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Circle No. 19 on Inquiry Card



### English By Television And Radio Courses:

In addition to Speak Easy, which represents a new development in the use of video for language teaching, this free 12-page catalog also lists television and radio courses available on video and audio cassettes and are designed specifically for learning and teaching English as a second language. All are intermediate level and have been designed for people studying alone as well as for use in class. With their dramatizations of practical situations, each course can make the difficult process of learning English as a foreign language interesting and enjoyable. *Jeffrey Norton Publishers, New York, NY.*

**Circle No. 100 on Inquiry Card**

**Video Products Brochure:** This catalog features products for video instruments and compressed video equipment. These video products are

utilized for the transmission, storage, processing and analysis of television images. Some typical applications include remote area health care, library interconnection, pseudo color generation and electronic art, among others. *Colorado Video, Inc., Boulder, CO.*

**Circle No. 152 on Inquiry Card**

### Guidance Information System

**Brochure:** Broad new areas of information have been added to this revised 8-page full color brochure to help people make crucial life decisions by making full and efficient use of the vast body of occupational, schooling and financial information. "Options" programs have been devised to custom-tailor to local needs and criteria. Provisions have been made to provide low-ability readers with career information. *Houghton Mifflin Co., Hanover, NH.*

**Circle No. 146 on Inquiry Card**

**FILM FILE:** Over 15,000 titles are described within the 1982-83 edition of this film & video resource guide that lists titles currently available from 85 educational, independent and specialized distributors, sorted within specific subject and programming areas.

Sixteen major curriculum areas (business & economics, education and teacher training, foreign languages, guidance & counseling, humanities, industrial education, mathematics, social sciences, etc.) are described, and each is broken down into logical and concise sub-topics and programming areas. An alphabetical topic index can be used to pinpoint very specific subjects and concepts within the 16 major areas.

The new edition also includes an alphabetical title index listing title, release date and distributor. (\$30.00 per copy) *Media Referral Service, Minneapolis, MN.*

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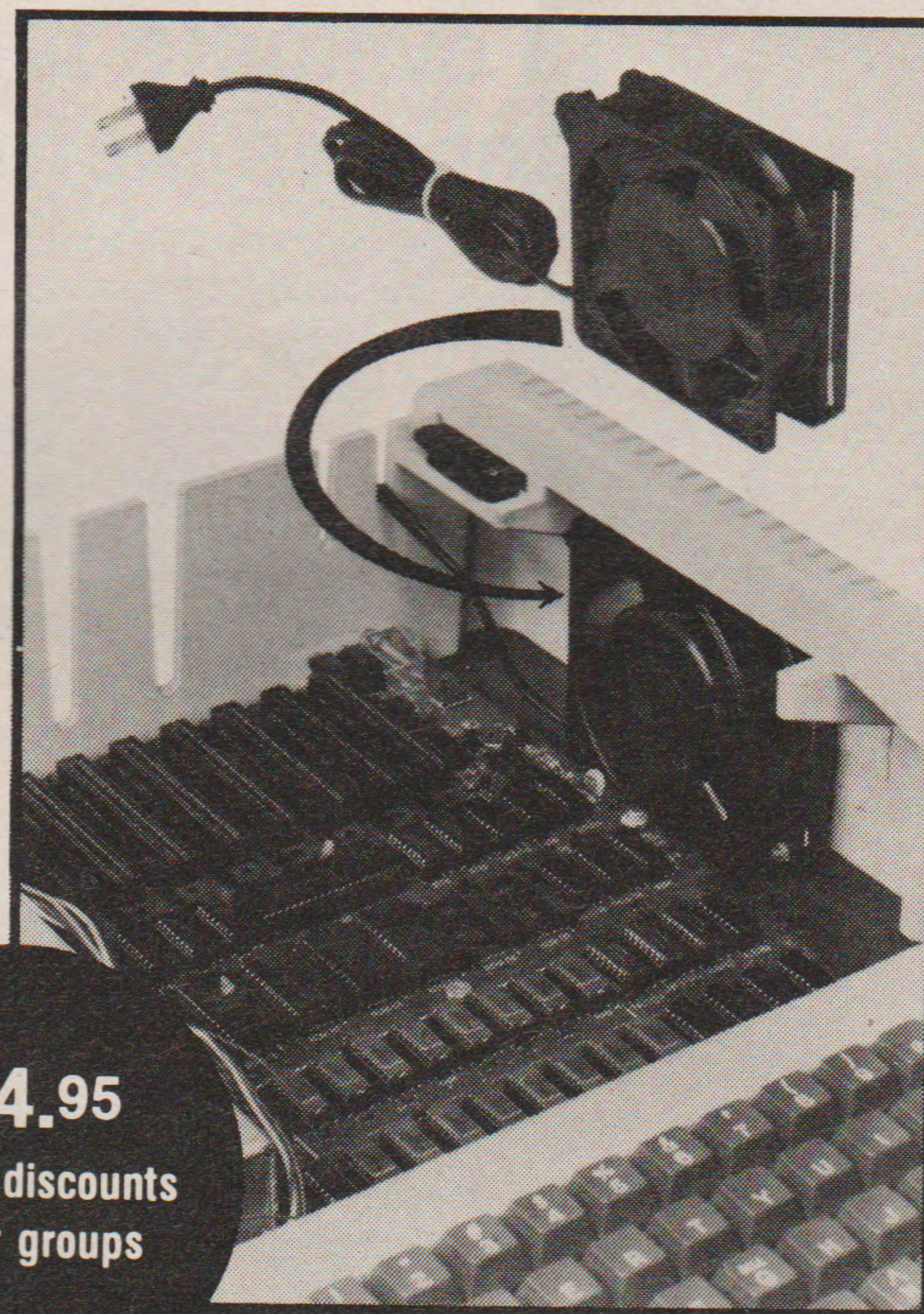
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**Circle No. 18 on Inquiry Card**

T.H.E. JOURNAL 35



**Free Computer-Based Learning Materials Catalog:** All new computer-based learning materials are described in this 22-page color catalog.

Five sections are listed: mathematics, science, computer literacy, language arts and special education.

Problem Solving in Algebra to develop student skills in the areas of functions, variables, number sentences, equality, translating verbal and math sentences, solving equations of one, two and three unknown and systems of equations; and Math Skills at both the elementary and junior level to provide practice in mathematic concepts and basic operations and processes are described within the math section.

The Science section covers such diverse subjects as energy and life, the cell, acids and bases and stoichiometry.

Understanding computers and Computers in our Society are de-

scribed in the Computer Literacy section, while in the Language Arts Section grammar and writing, basic English skills, Wordwright (a programmed series which proves that learning vocabulary can be fun) and reading for comprehension are featured.

The last segment, CARIS (computer animated reading instruction system) introduces reading skills to low-readiness children. *Encyclopaedia Britannica Educational Corp., Chicago, IL.*

**Circle No. 145 on Inquiry Card**

**Computers in Business Education:** is the theme of this issue of Business Education World. The 34-page magazine features such articles as What is Computer Literacy?, Why Computer Literacy Belongs in Business Education; How to Prevent Diskette Disasters; Computer Literacy

for the Inexperienced Teacher; and the results of a Chicago study dealing with how microcomputers are used in high schools. It is published five times each school year as a service to business educators. To be placed on their mailing list, a request must be made on school letterhead indicating the business subjects taught. *Gregg/McGraw-Hill, Hightstown, NJ.*

**Circle No. 101 on Inquiry Card**

**Free Small Computers Brochure:** A new four-page booklet outlines the maintenance challenge confronting manufacturers of small personal computers. It presents some interesting new self-maintenance concepts for computer companies and users alike. It also discusses how some innovative computer companies are implementing these self-maintenance procedures and making a profit at the same time.

Computer care products extend the life and improve the performance of both computers and media. Included in this product line are hard disk cartridge cleaners and inspectors, flexible disk head cleaning kits, flexible disk conditioners and other maintenance supply and accessory items. *Innovative Computer Products, Tarzana, CA.*

**Circle No. 112 on Inquiry Card**

**Free Discount Software Catalog:** Three free discount software catalogs have been made available. Catalog #10 for Atari lists many hundreds of programs from over 50 publishers, the most comprehensive collection of Atari software at discount prices ever offered in one place. Catalog #11 for VIC-20 is the first catalog devoted exclusively to VIC-20 products and lists hundreds of programs. Catalog #12 for Apple lists several thousand programs from over 140 publishers, all at discount prices, the most complete discount catalog of game, education, business and utility Apple software. *Queue, Inc., Fairfield, CT*

**Circle No. 131 on Inquiry Card**

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**Circle No. 58 on Inquiry Card**



# THE LEMON<sup>TM</sup> SOURS SURGES



Our crop-The Lemon<sup>TM</sup>, The Lime<sup>TM</sup>, and The Orange<sup>TM</sup> are designed to eliminate undetected submicrosecond overvoltage transients from electrical circuits. Commonly referred to as "spikes", or "glitches", these transients can cause hardware and software damage to unprotected circuits.

Today's electronic products are often microprocessor controlled - mini and micro computers, televisions, video cassette recorders - to name a few. Each of these products is sensitive to fluctuations in electrical power lines. Power switching devices such as refrigerators coming on and off or air conditioners starting up can be responsible for a momentary surge or spike of electricity in a circuit. Even your local

utility stepping-up transformers to add power at peak load times or an electrical storm passing through can trigger surges. Such surges can cause equipment to falter at times, not to work at peak performance or fail completely. An entire data base can be lost.

Now you can prevent this from happening to you with an AC Surge Protector from Electronic Protection Devices. Each Protector is a solid state clamping device with 6 outlets utilizing modern high speed semiconductor technology. Using our Protectors is as simple as plugging it into any standard three wire duplex outlet then plugging what needs protection into it. Each Protector exceeds the IEEE 587-1980 Guide for Surge Voltages in Low

Voltage AC Power Circuits.

When you compare the cost of computer hardware, software and your time with the price of a Protector (from \$59.95 to \$139.95), you'll want to sour your surges with one of the AC Surge Protectors from EPD, which are available through your local dealer.

**Circle No. 8 on Inquiry Card**

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But we can simplify matters by describing just four of the many administrative applications an Apple can put in your hands:

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Word Processing. Once a time consuming secretarial function, Apples have made it easier for everyone who writes. They allow you to compose, edit and revise reports, memos and letters far faster than with an ordinary typewriter. There are even programs

for Apples that "look up" common words for correct spelling. So everything you write comes out letter perfect.

Record Keeping. "Data base management" is the most common use for computers of all types and since the advent of Apples, is now available to schools on the tight budgets. Unlike paper files, "electronic files" can be automatically cross-tabulated. So you can selectively retrieve the information you need from student grade records, personnel records or financial records faster and more efficiently.

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with the cumbersome worksheet of rows and columns. But when that worksheet becomes electronic using VisiCalc® software and an Apple, the results are electrifying. Classroom schedules can be developed and modified with a few keystrokes instead of constant erasures and recalculations. Budgets become fluid, easier to analyze and simple to revise. So you can ask "What if?" questions like "What if the school bond passes?" and gain an instant grasp of the implications.

**Presentations.** One picture is worth several hundred numbers, and Apple Business Graphics can

turn attendance records, salary trends, maintenance costs or any other information into colorful graphs, charts or scatter-grams. Which not only gives you a better grasp of what's going on, but provides you a more effective way of communicating the facts to others.

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Because Apples can serve both in the classroom and in the office, they're far more cost-effective than single-duty computers.

The same Apple that can help teach math in the morning can tell you everything you need to know about student activity funds in the afternoon with Addison-Wesley's "Bursar" program.

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**Circle No. 29 on Inquiry Card**



**The Secret Guide To Computers:** "Kids should start writing simple programs in BASIC when they're in the third grade. (The brightest kids can start even younger!) Before the third grade, the typical kids should learn how to run other people's programs (by typing the word RUN) and maybe should learn LOGO, which is a language for

beginners that's easier than "BASIC." All this and more is featured in this 80-page guide. Eleven chapters are included: News, the latest news about Apple, Radio Shack, IBM and much more; Visionaries, how robotics and cybernetics were invented; Understanding English, how to make the computer understand everyday English instead of just computer lan-

guage; Mental Games; Artificial Intelligence; In the Home: Education, how can schools create wonderful computer-education programs effectively and inexpensively; Dangers, will the computer wreck your life?; Three-Dimensional drawing, an easy-to-use trick for making the computer draw three-dimensional pictures; Create Your Own Data Bank; and Numerical Analysis. Previous volumes dealing with how to program BASIC, explanations of languages more advanced than BASIC, among others, are also available. (\$3.70 per volume or \$29.60 for all eight). *R. Walter, Boston, MA.*

**Circle No. 270 on Inquiry Card**

## A sophisticated Z80™ based microcomputer training system.

### Only \$500.



The Fox is the most cost-effective and versatile microcomputer training system on the market today. At the heart of The Fox is a Z80 CPU, a chip which includes more capabilities than any other 8-bit microprocessor.

With a large memory capacity and sophistication found only in larger and more expensive units, The Fox is ideal for teaching microcomputer technology in schools, colleges and industrial training environments. Other features include extensive user prompting firmware, large digital readouts, power supply and exceptional versatility.

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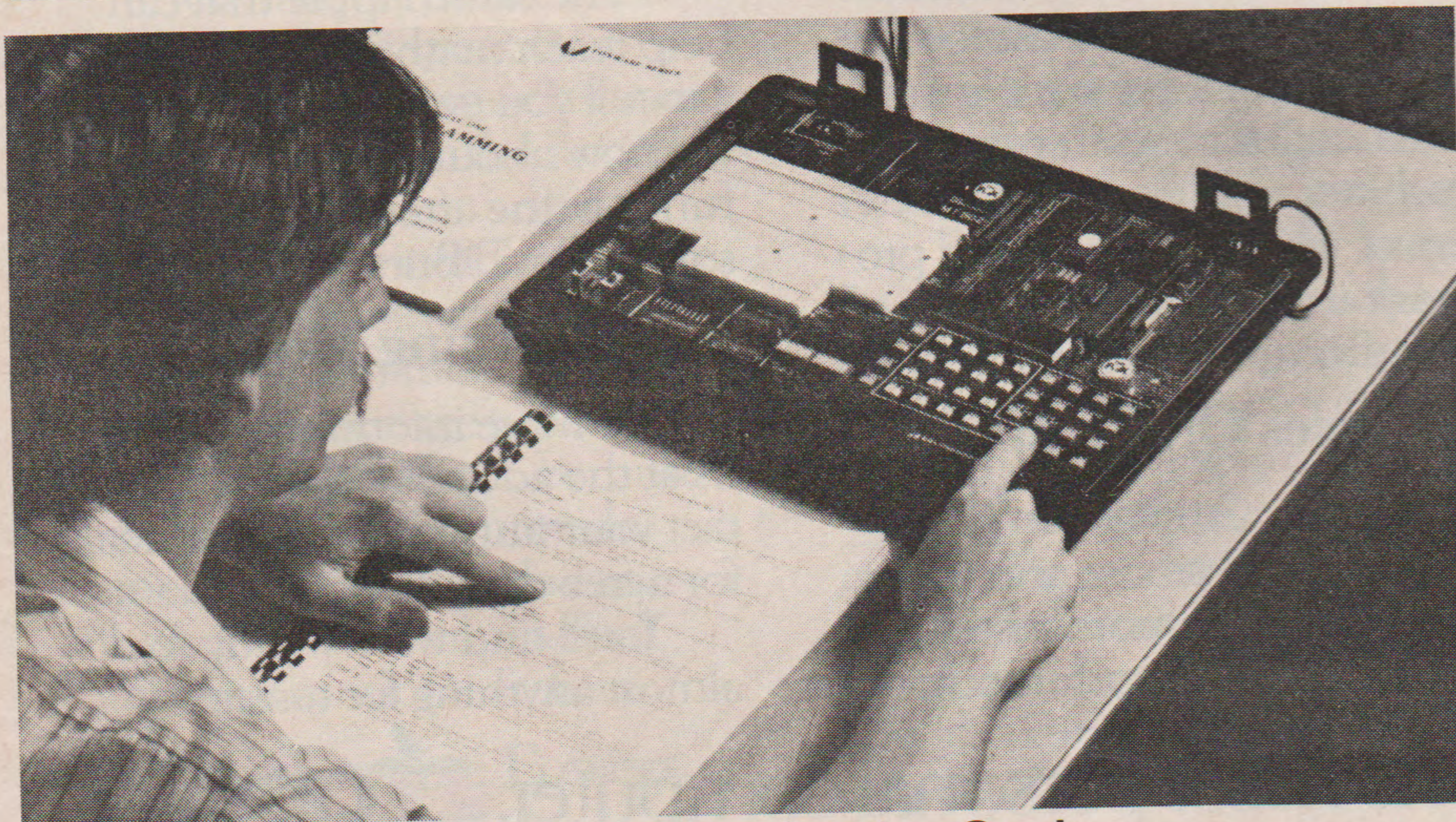


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**Circle No. 26 on Inquiry Card**

### Educational Software Catalog:

The programs described in this free, 10-page catalog have been tested in the classroom and revised on the basis of classroom experiences. They are not just drill and practice programs. Some actually teach the topic covered. Others use a game to develop a skill or a problem-solving strategy. Still others are instructional tools useful for teacher demonstration or for individual student use. The programs are available in Apple, Atari 400/800, TRS-80 and Apple Pascal packages. *Steketee Educational Software, Philadelphia, PA.*

**Circle No. 149 on Inquiry Card**

### Career Planning Guide:

This 16-page brochure describes the professional training modules provided by ATS to support System/34 installation, programming and operations and introduces the Automated Training Center, where personnel are provided hands-on instruction under professional guidance. A job training matrix matches the job functions associated with the operation and performance of the System/34 with the courses that provide the skills required to perform those functions. *Automated Training Systems, Woodland Hills, CA.*

**Circle No. 261 on Inquiry Card**



# THE PEACH™ WITHOUT FUZZ



The Peach™ is the newest addition to Electronic Protection Devices crop of EMI/RFI Filters/AC Surge Protectors. It eliminates transients such as "spikes" or "glitches" same as The Lemon™, The Lime™ and The Orange™ while simultaneously filtering out "fuzz" or "noise" produced by Electro Magnetic Interference (EMI) or Radio Frequency Interference (RFI).

The increasing complexity and scope of modern electronics demands that each microprocessor controlled product perform its function without extraneous signals of any kind that would degrade or reduce the intelligibility of that product. "Hash"- electrical noise from rapid opening and closing of contacts or

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Compare the cost of computer hardware, software and your time with the price of our Peach (\$97.50). You'll opt for a line free from surges and no fuzz with The Peach from EPD. Available through your local dealer.



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**Circle No. 16 on Inquiry Card**



# Books



**TRS-80 Data File Programming Model I/III** by LeRoy Finkel and Jerald R. Brown. \$11.95 (softbound). Tandy Corp., Houston, TX.

This book is a non-technical, self-paced and self tests guide readers (with a working knowledge of TRS-80 BASIC) through each step in data file programming. It also offers practical advice on how to use disk files to keep track of billings, customer inventory and expenses, how to catalog material and maintain mailing lists and how to process numerical and statistical information.

**Circle No. 116 on Inquiry Card**

**Video User's Handbook**, by Peter Utz. 500 pages, \$14.95 (softbound), Prentice-Hall, Englewood Cliffs, NJ.

This book teaches how to use various kinds of television equipment. It shows how to operate TV cameras, video tape recorders, monitor/receivers and other devices. It includes information on such skills as editing, sound, lighting, graphics, color, special effects, maintenance, purchasing and creative production techniques and shortcuts.

It differs from most other TV texts in the way it is written. First, it starts very easy and slowly progresses through fundamental skills before it forges into advanced and complicated

TV work. No prior knowledge is assumed. Everything is included, no matter how elementary.

This handbook is of special interest to media directors who contemplate their school's expansion into the area of television, teachers who wish to develop instructional materials themselves as well as librarians who deal also with media, including television. Instructors may use it as a classroom text in television journalism, media or communications courses.

**Circle No. 129 on Inquiry Card**

**Microsoft BASIC, 2nd Edition**, by Ken Knecht. \$14.95 (softbound), Dilithium Press, Beaverton, OR.

This new edition starts the reader off with an introduction to programming in BASIC and a glossary of the computer terms that are used throughout the book. Such important topics as branching and loops, arithmetic in BASIC, strings, editing, arrays and files, the disk and additional useful features are covered.

This new edition omits references to dated systems and adds a new chapter on the Microsoft BASIC Compiler. The new chapter also explains the differences between a compiler and an interpreter. However, the book's main emphasis is on interpreting BASIC.

It describes the latest version of Microsoft BASIC, release 5.0. While this release of BASIC-80 is the newest version of Microsoft BASIC, some popular microcomputers may use a slightly different version. However, the differences are small and easily changed by adaptations which are shown in the book. One popular Microsoft version covered is that which is supplied with the TRS-80 Model III. This version compares with BASIC-80.

Only a basic understanding of computer fundamentals is required. This powerful version of BASIC can save valuable programming time and effort through examples that run.

**Circle No. 132 on Inquiry Card**

**The Power of: VisiCalc, Volume II**, by Robert E. Williams and Brian L. King. 98 pages, \$9.95 (softbound), Prentice-Hall, Inc., Englewood Cliffs, NJ.

Simplicity is the key to this book. Without any special training or prior knowledge, you can use it to take full advance of VisiCalc's commands and functions. This book provides specific examples of problem solving and shows you how to customize those examples to utilize the information that they provide in solving your own problems. It contains instructions that are written in plain English and step by step logic functions that are clearly spelled out.

This book gives the opportunity to realize some of the power of the VisiCalc program and the importance that it can be in the everyday operation of your computer system. Business owners, educators, engineers or anyone who has problems that can be solved with the use of numbers and logic will find that literally hours and days can be saved and put to more productive use.

**Circle No. 142 on Inquiry Card**

**Understanding Digital Logic Circuits**, by Robert G. Middleton. 392 pages, \$18.95 (softbound), Howard W. Sams & Co., Inc., Indianapolis, IN.

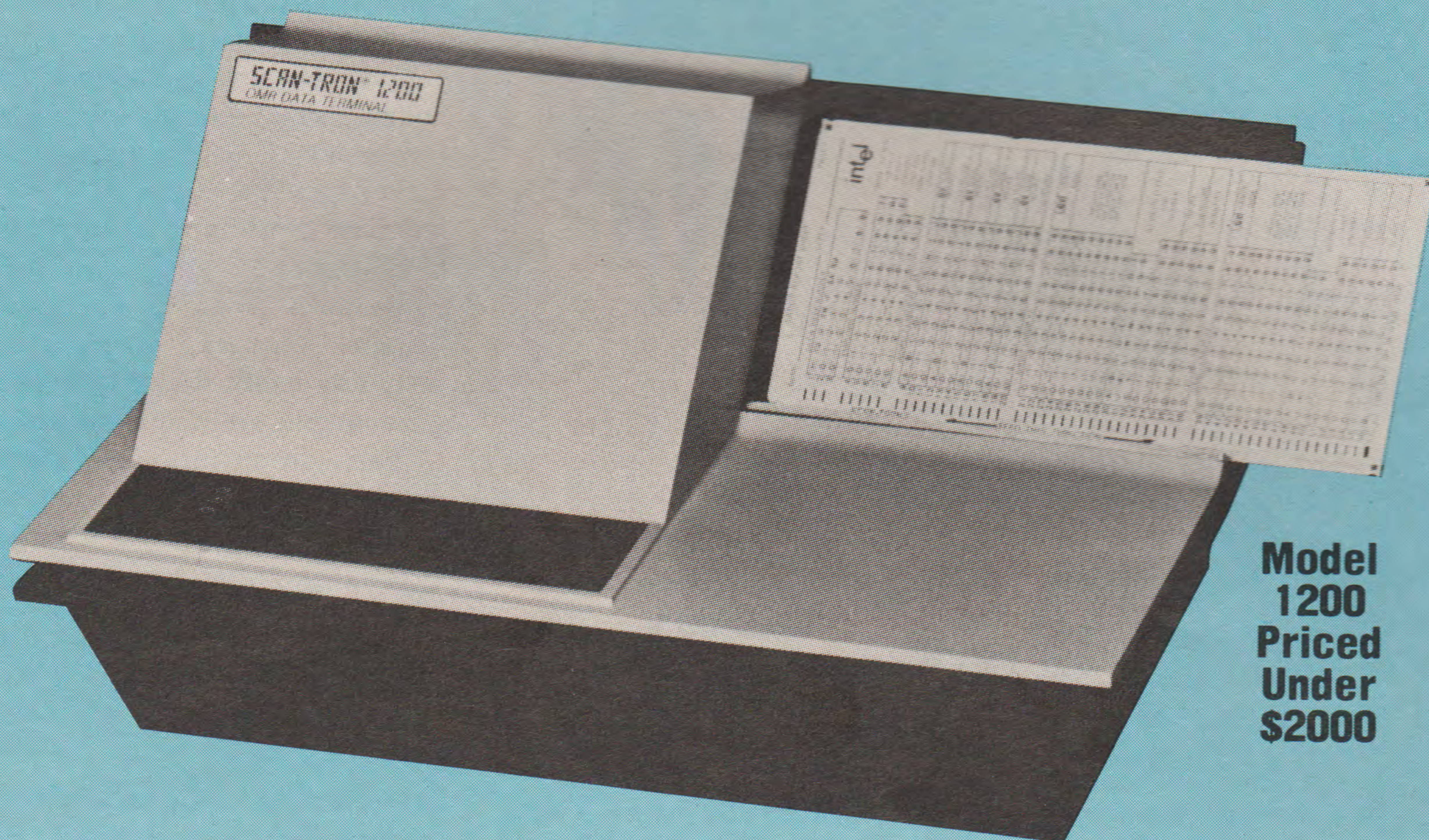
This practical handbook starts with an overview of the "anatomy" of digital logic diagrams. In the second chapter, additional logic gates and circuit operation are described and illustrated. The sixth chapter covers additional flip-flops and monostable circuitry. The related area of digital counters is covered in the eighth chapter and continued in Chapter 9 with discussion and examples of frequency dividers. Chapter 14 includes explanations of binary multiplication and division while the important topic of shift-register memories, random-access memories and read-only memories is covered in Chapter 15. This book contains a total of 19 chapters.

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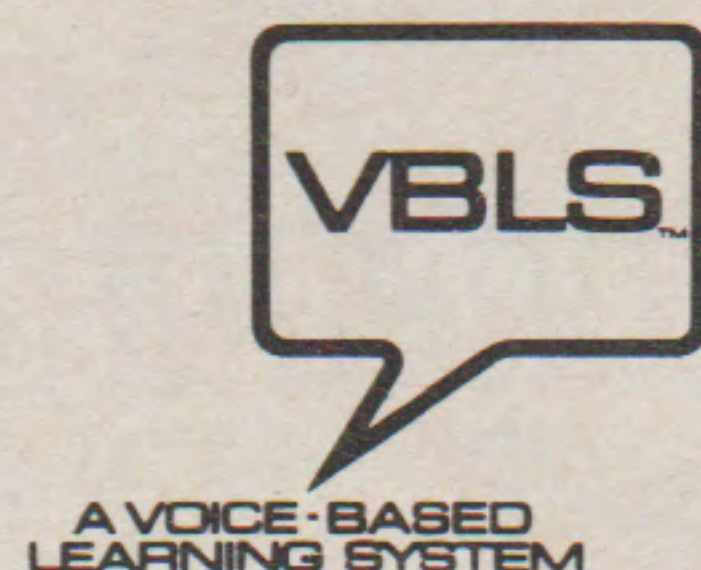
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**Circle No. 3 on Inquiry Card**

**Audio-Visual Equipment Directory**, 530 pages. \$35.00, National Audio-Visual Association, Fairfax, VA.

Having evolved into an authoritative, comprehensive source of information on audio-visual and video equipment and systems, this directory lists over 2000 AV/video/microcomputer equipment items in a single volume. It provides the most recent and important information needed by communications professionals to make their AV purchases easier and less time consuming. All listings include uniform specifications for easy comparison, including price, model, weight, capacity, accessories and technical details. Over 1500 product photographs are also featured.

This edition introduces four new sections for video equipment: interactive video systems, video disc players, videotape edit controllers and tape cleaning and evaluating equipment.

**Circle No. 137 on Inquiry Card**

**Developing Computer Solutions For Your Business Problems**, by Henry H. Petersohn, 157 pages, \$14.95 (softbound), Prentice-Hall, Inc., Englewood Cliffs, NJ.

Written to answer the questions: How do you get the data processing experts to understand what is wanted?; How can you be sure that the DP experts will give you what is needed?; How can you get them to change directions if your needs change?; and What choices are in terms of cost versus services?; this book guides the reader in defining the problems. The first chapter describes establishing application objectives and definitions. The second chapter focuses on alternative solutions which can be time and dollar savers. The third chapter describes how functional requirements are established while the next two chapters describe how and where a management audit is desirable. The concluding chapter outlines trends in automation that can affect computer application plans.

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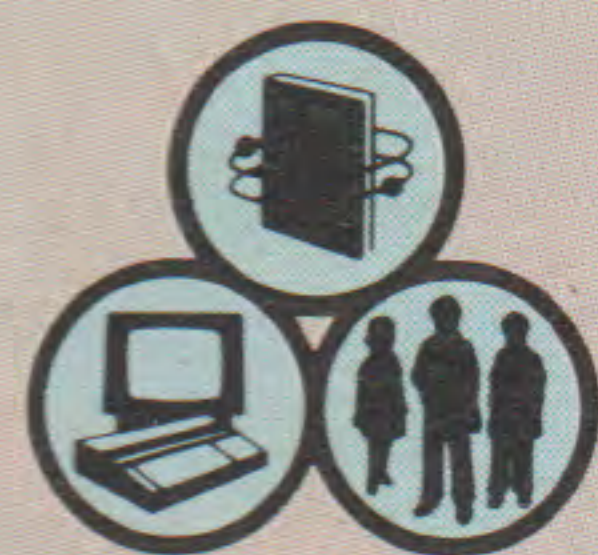
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**Microcomputer Directory: Applications in Educational Settings**, compiled by the staff of the Gutman Library, Harvard University, 318 pages, \$15.00, Harvard U., Cambridge, MA.

This second edition provides a much needed service to schools and other institutions just beginning to use microcomputers as well as to those institutions searching for specific applications. The method employed for information gathering was a mass mailing to schools in every system identified as having microcomputers. Almost 1200 responses were edited, combined and prepared for publication. Types of computers, software and sources of funding are listed. Most schools responded that they presently had a small number of computers, had additional orders in process and plans for more within the coming year. Applications seem to be clearly divided among individualized student/teacher initiatives, tutorials, drill and practice and growing administrative uses. The growth in simulations, particularly in science and social studies, has not kept pace with increased drill and practice in language arts/reading and mathematics programs. While great increases in the quality and variety of applications in schools appear in this volume, it is still merely representative of the vast individualized and comprehensive use of microcomputers in the nation's educational institutions. It serves as the beginning of an important database that will continue to be a source of information and assistance.

**Circle No. 154 on Inquiry Card**

**Writings of the Revolution: Selected Readings on Software Engineering**, edited by Edward Yourdon, 460 pages (softbound), Yourdon Press, New York.

This book is a new collection of twenty-five hard-to-find articles that helped define the state of the art in software analysis, design and programming. Along with its compan-

ion volume entitled "Classics in Software Engineering," the set constitutes a historical record of the major developments that revolutionized the software field.

**Circle No. 268 on Inquiry Card**

**Communications Technology in Education and Training**, *Proceedings of the Fourth National Conference on Communications Technology in Education and Training*, 186 pages, \$20.00 (hardbound), Information Dynamics, Inc., Silver Spring, MD.

Addressing itself to the potential of communications technology to assist trainers in meeting future training needs and the help which colleges and universities can provide, this book contains nine main chapters. Chapter One, for example, titled Overview, lists a Status Report from OTA (Office of Technology Assessment Study) whose four major goals are to assess existing federal interest and roles, to determine the opportunities and barriers for use of information technology in the schools, to determine the effects of information technology on educational needs and to assess future policy options for Congress. Key Elements of a Satellite Videoconferencing Network deals with "dedicated" and "ad hoc" types of networks. According to the author, "Information transfer will be the main line of business. The new mandarins will be the information managers. The emphasis in education will be on process, rather than on data. The 1980's and 1990's possibly will be the most exciting decades in the history of the world." Other topics covered are: Company Use of Communications Technology; Computer-Assisted/Computer-Based Training for Industry; Multi-Media Training Approaches; Colleges and University Use of Communications Technology to Serve Industry; The Consortium Approach to Serving Industry Training Needs; Building Bridges; and Building More Effective Industry-Academic Relationships.

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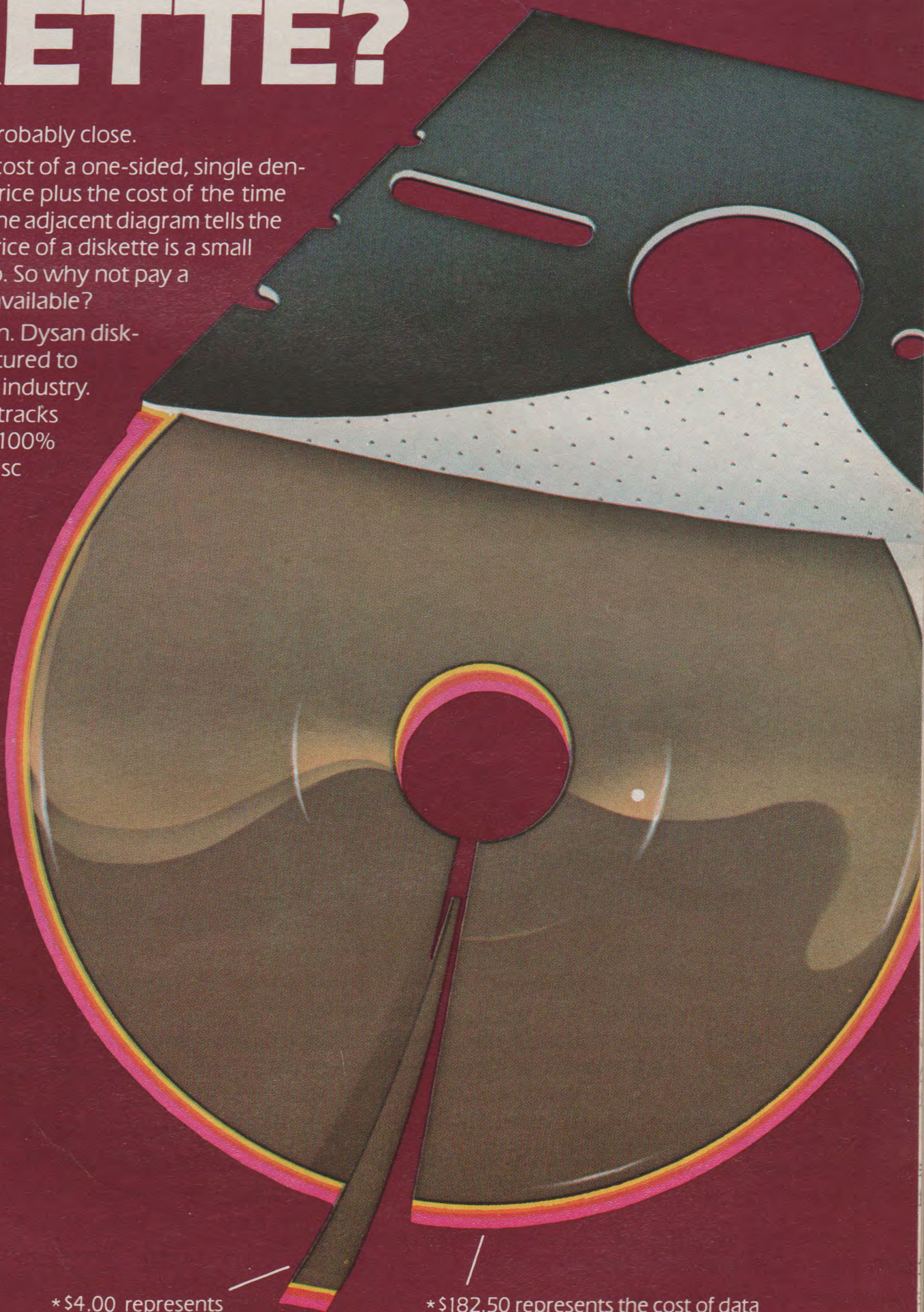
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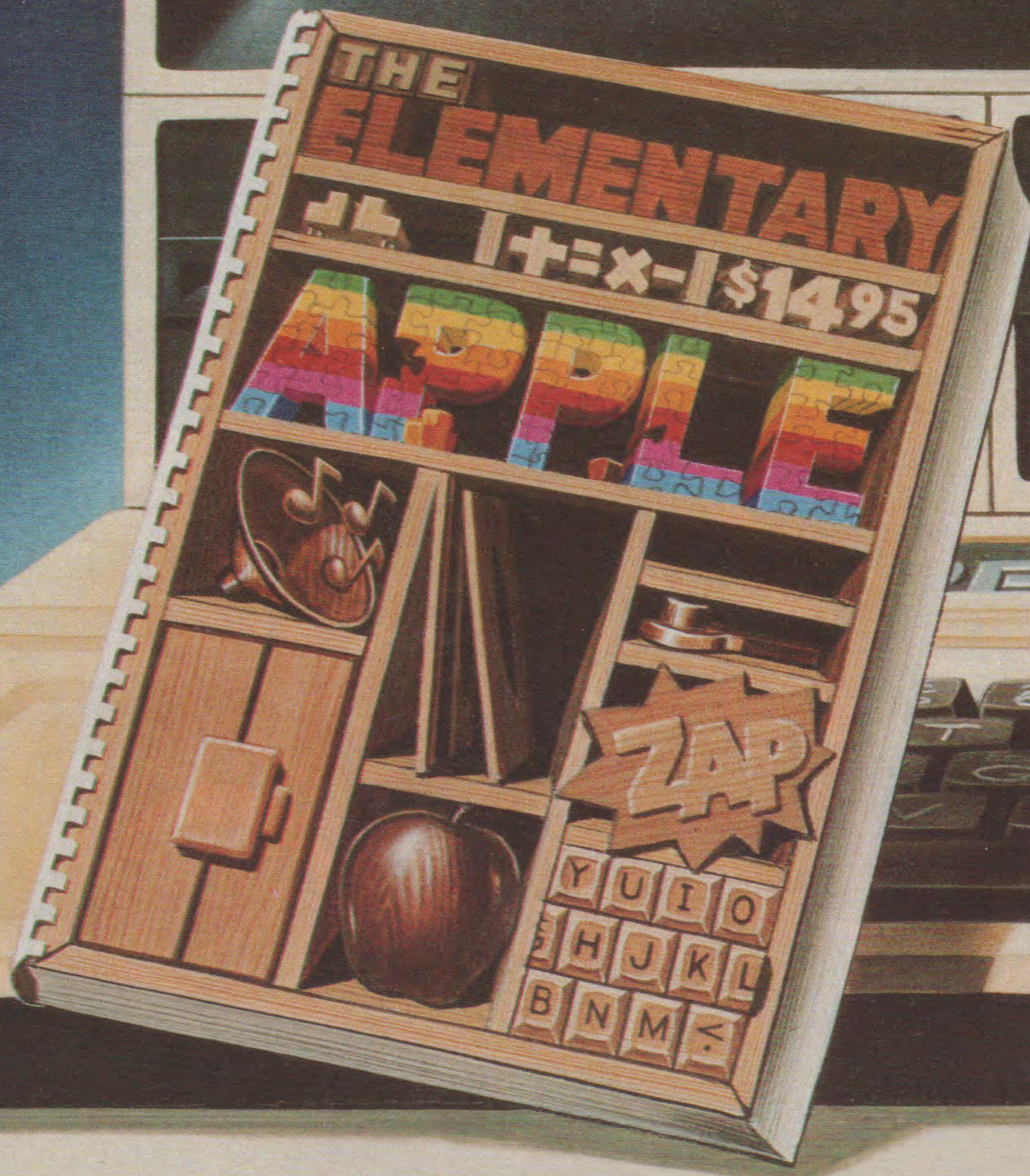
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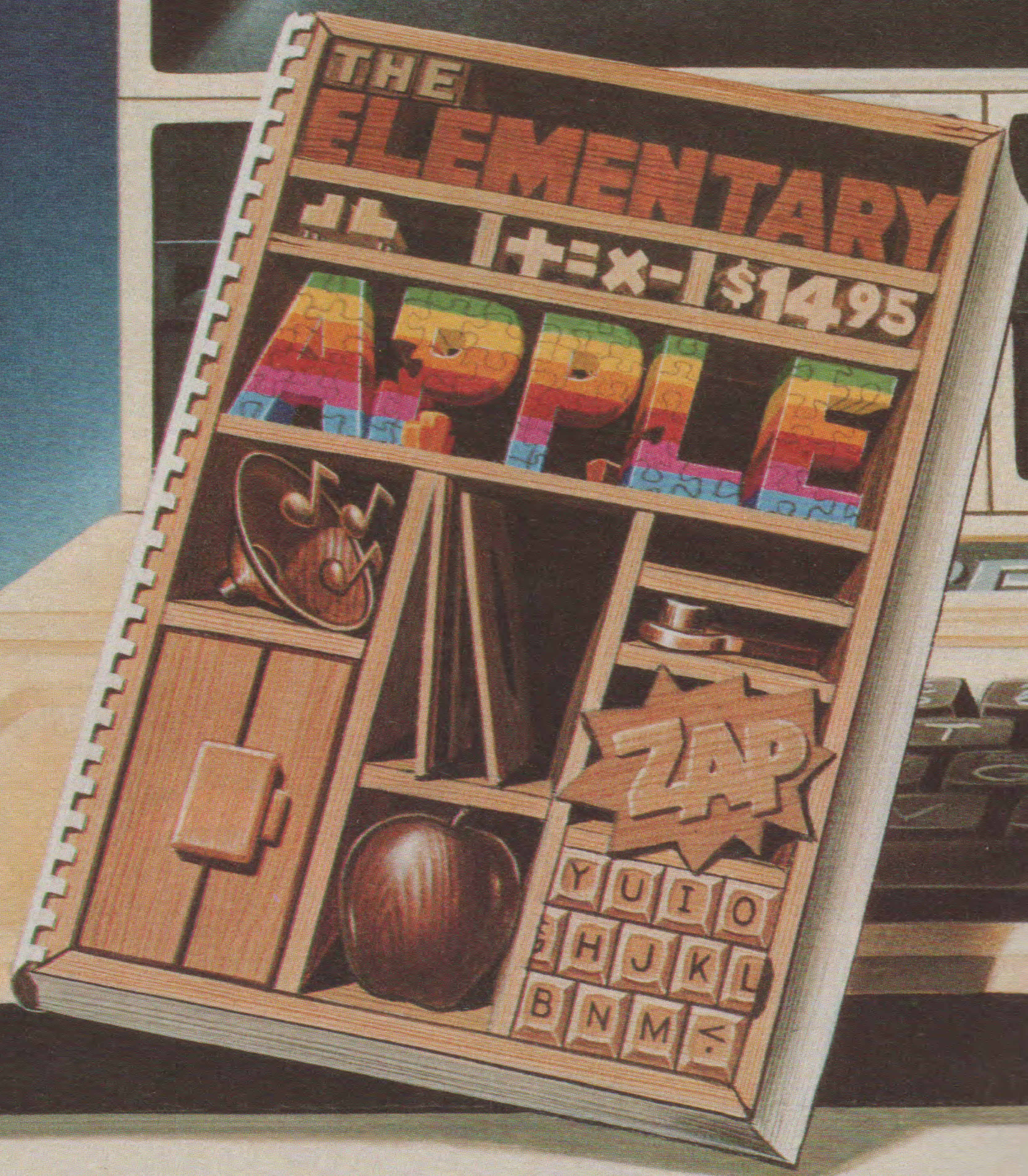
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**Discover BASIC:** *Problem Solving with the Apple II Computer*, by Rick Thomas. 221 pages, \$74.85 (teacher's guide & materials), Sterling Swift Publishing Co., Austin, TX.

The overall intent of this book is to provide a comprehensive introduction for students and teachers in programming and problem solving instruction using the APPLESOFT version of the BASIC computer language. It is an all-inclusive, hands-on introduction to programming and problem solving. Materials described in this Guide are the result of six years of experience teaching programming at the secondary level and two years of unsuccessful use in a classroom.

This book uses demonstration programs on disk for student experimentation. The student is asked to make a change in the demonstration, rerun the program and write a brief description of differences resulting from the change. It also stresses top-down stepwise approach to problem solving and is a mix of traditional expository teaching with interactive computer lab activities; reading assignments; drill and practice; small group activities; and heavy emphasis on using the computer to solve a wide range of problems. Also included is a solutions disk with sample solutions to all supplementary programming problems.

**Circle No. 134 on Inquiry Card**

**Atari Pilot For Beginners**, by Jim Conlan and Tracy Deliman, 230 pages, \$14.95 (softbound), Reston Publishing Co., Reston, VA.

Learning how to make the Atari play music, display colorful moving pictures and do mathematics is possi-

ble with this new book. The Pilot computer language is designed to do important things both quickly and easily. With the use of this book, it is feasible to give commands in the Pilot language as soon as one sits down to use the computer for the very first time. It is especially designed to let the beginner learn through play and experiment about computer programming. All of the programs included in this book were tested by children and beginning adult computer users.

**Circle No. 267 on Inquiry Card**

**Using the IBM Personal Computer**, by T.G. Lewis. 239 pages, \$18.95 (hardbound), Reston Publishing Co., Reston, VA.

The best way to learn about computers is by using one. This book is therefore written from the point of view of the user. Each topic is approached from a "how to" perspective. In fact, many of the examples have been photographed directly from the computer screen so that what the computer does can be seen exactly.

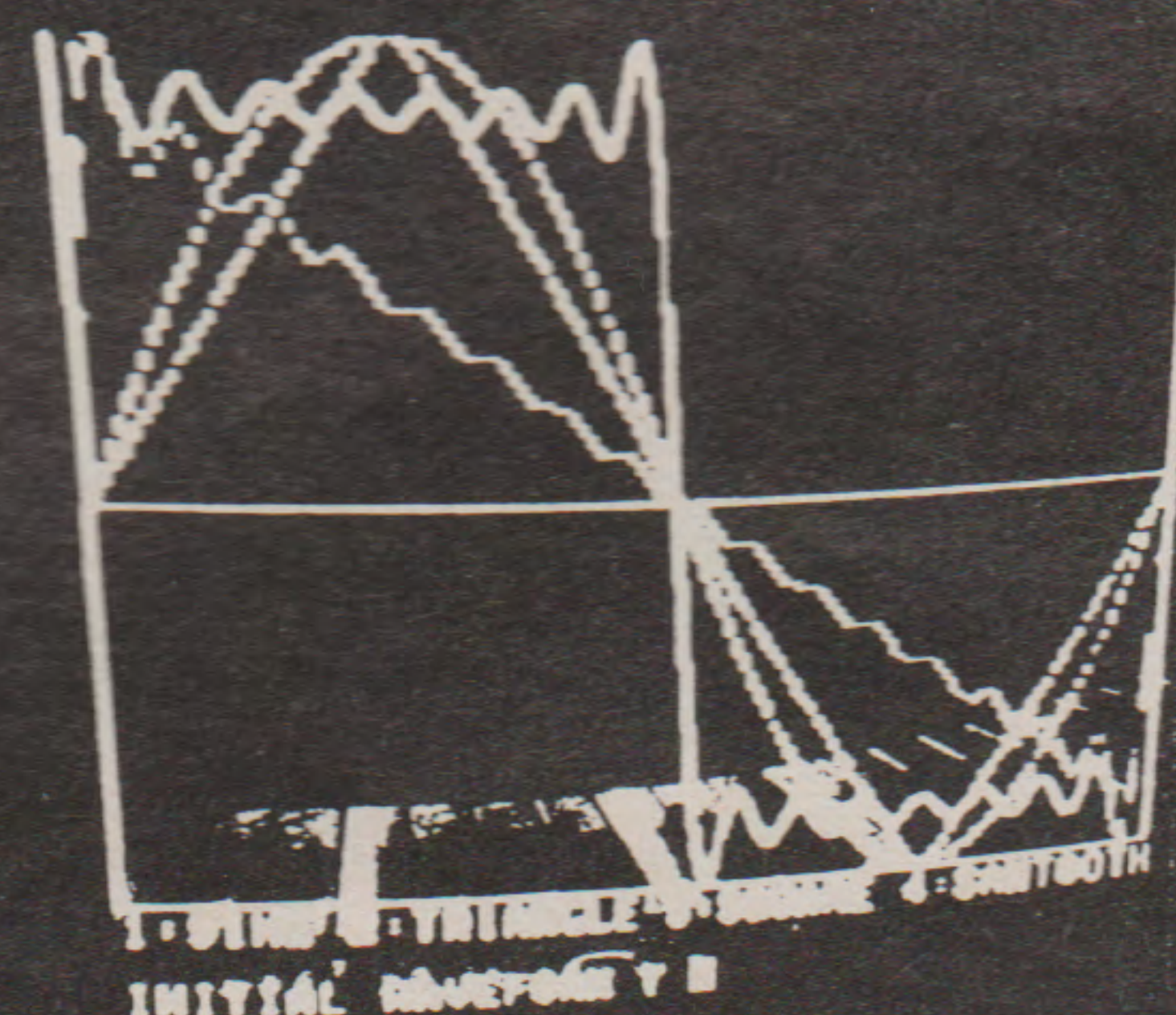
In Chapter I, several areas where computers can be of benefit are examined, namely: word processing, spreadsheet calculations, general problem solving and database processing. These are treated in depth in subsequent chapters. Chapter VII covers a topic that promises to loom big on the small computer horizon. Database management systems are very important programs for reducing the rising cost of software. Which is best? In this chapter different types of database models are explored. In all, this book contains eight chapters: What can computers do?; A quick guide to computer vocabulary; How to get started with the IBM personal computer; How to do word processing; How to do spreadsheet calculations; How to write your own programs; An introduction to database processing; and How computers work.

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**Circle No. 1 on Inquiry Card**



**So You Are Thinking About A Small Business Computer**, by R. G. Canning and N. C. Leeper, \$10.95 (softbound), Prentice-Hall, Englewood Cliffs, NJ.

Specifically designed for the business person with little or no knowledge of computers, this book offers practical step-by-step guidelines for successfully selecting a small com-

puter system and using it in daily office routines. It explains how computers work, what they can be used for and how to use them most effectively to save time, money and effort in day-to-day office procedures. In addition to essential computer definitions, checklists, worksheets, and a list of leading computer supplies, this guide includes expert tips on how

to select software for specific computers and how to contact vendors and consultants.

**Circle No. 262 on Inquiry Card**

**Microcomputers in the Schools**, edited by James L. Thomas, 300 pages (softbound), The Oryx Press, Phoenix, AZ.

This volume is a key resource for schools with microcomputers already in service as well as for those planning to acquire them. It begins with an original State of the Art essay on the development and use of microcomputers in schools. It then moves to main divisions titled General Applications, Hardware, Software and Trends and Issues. Helpful appendices include Glossary of Terms, Resources and Shopping Guide, Funding Sources and Persons and Centers Active in Micro Usage. Microcomputers in the Schools also features an extensive bibliography

**Circle No. 264 on Inquiry Card**

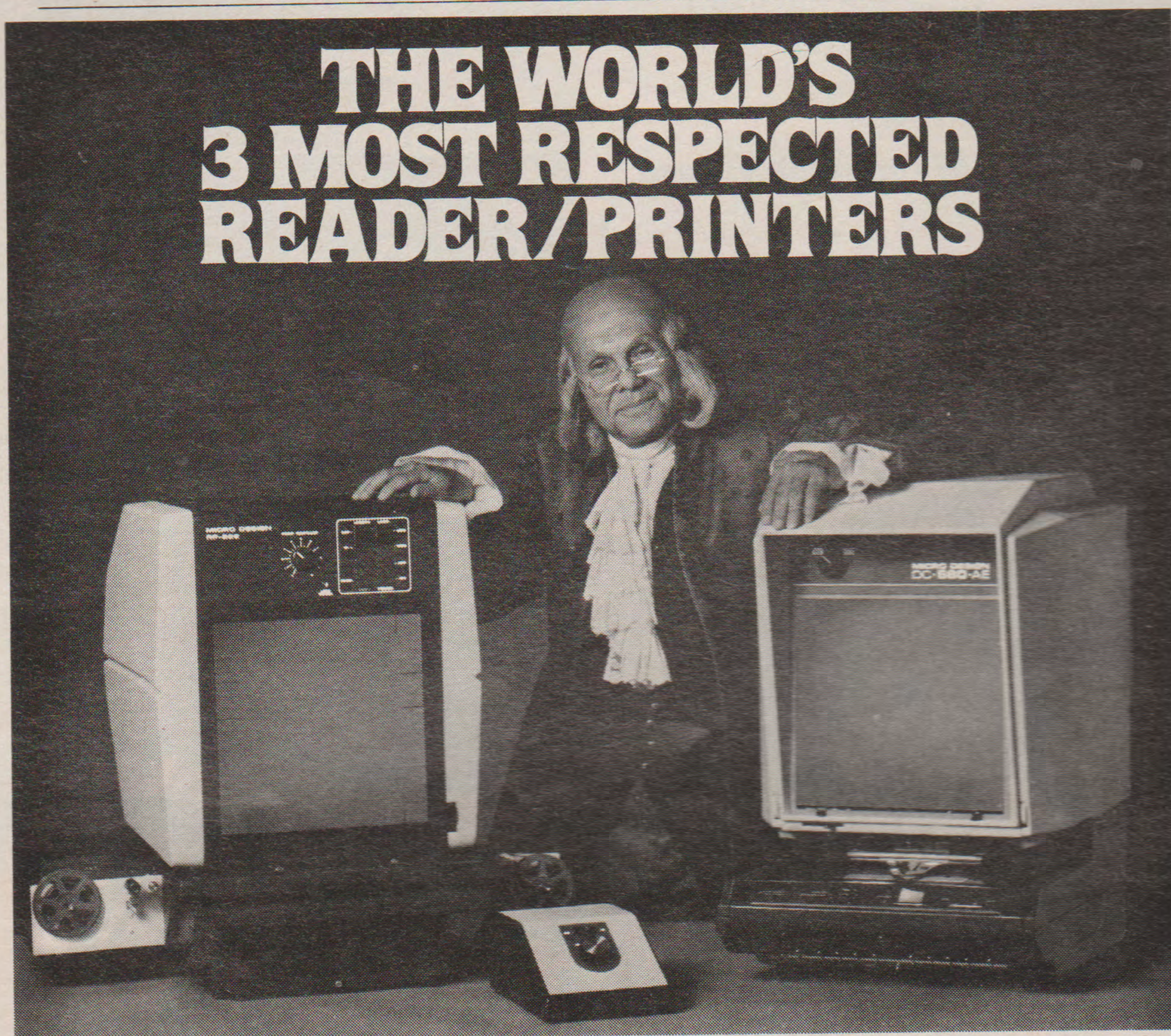
**Picture This Tool!**, by David D. Thornburg, 224 pages (spiral), \$14.95, Addison-Wesley, Reading, MA.

Exploring the exciting possibilities for kids of all ages to learn to use the personal computer, this book combines two remarkable contemporary educational tools, Apple SuperPILOT and Turtle Geometry, to help readers learn to solve problems, create pictures and invent games using the Apple II computer.

SuperPILOT is a powerful computer language, simpler than BASIC, that allows kids to talk with the computer. Turtle Geometry is a computer graphics technique, incorporated in the SuperPILOT language, that enables kids to create pictures in full color in a myriad of designs.

The author builds this imaginative book on the premise that children and adults alike can not only learn to use a computer but can invent programs of their own. It is the modern replacement for coloring book and crayons.

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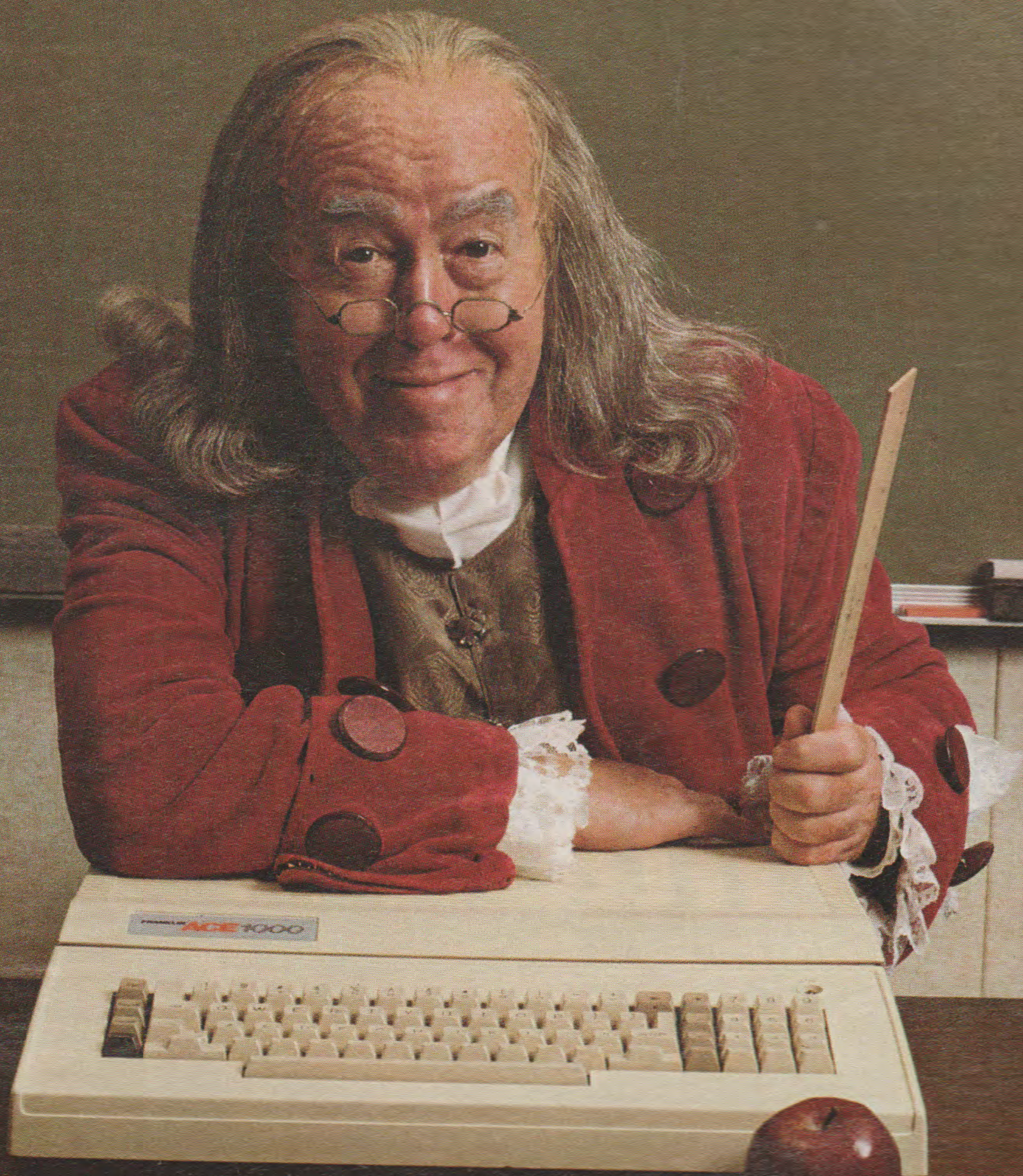
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**Circle No. 17 on Inquiry Card**



**Software And Services Sourcebook**, by Ruth K. Koolish. 500 pages, \$125.00, Information Sources, Inc., Glenview, IL.

This reference book lists which software programs are compatible with which hardware, the operating systems, languages, terms prices, training availability as well as the names, addresses and phone number of each vendor and covering software relative to IBM, Apple, DEC, Commodore, Honeywell and others. The limited edition of this sourcebook is **Circle No. 147 on Inquiry Card**

**Armchair Basic**, by Annie and David Fox. 180 pages, \$11.95 (softbound). Osborne/McGraw-Hill, Berkeley, CA.

An introductory book on the most popular of all microcomputer languages, BASIC, is available. It is written specifically for beginners who

do not have access to microcomputers but wish to become familiar with programming concepts. According to the authors, "Armchair Basic is written with humor and compassion for the computer neophyte, who, due to math phobia and other like maladies, has, until now, successfully resisted all conversion attempts made by computer enthusiasts. It is dedicated to the proposition that 'Anyone Can Learn Programming' and is designed for the casually curious as well as the utterly baffled individual who is finally ready to join the computer revolution."

Following a brief description of the working parts of a microcomputer systems, concepts such as variables, data input, if/then statements, controlled loops, random numbers, read/data statements, subroutines are discussed. Also included is a chapter on the future of computers.

**Circle No. 136 on Inquiry Card**

**Layman's Guide to the Use of Computers in Education**, by Dr. Sylvia Charp et al. 61 pages, \$4.00 (softbound), AEDS, Washington, DC.

A revised edition of this guide, partially funded through a grant from the Digital Equipment Corporation, was authored by Dr. Sylvia Charp, Director of Instructional Systems, School District of Philadelphia; Henry Altschuler and Richard D'Orazio, also of the School District of Philadelphia; Dr. William Bozeman, Educational Administration, University of Iowa; and Dr. Dennis Spuck, Chairman, Department of Administration and Supervision, University of Houston. Major topics include: Computers in Instruction, Main Components of a Computer System, The Language of the Computer, Administrative Applications and Historical Perspective.

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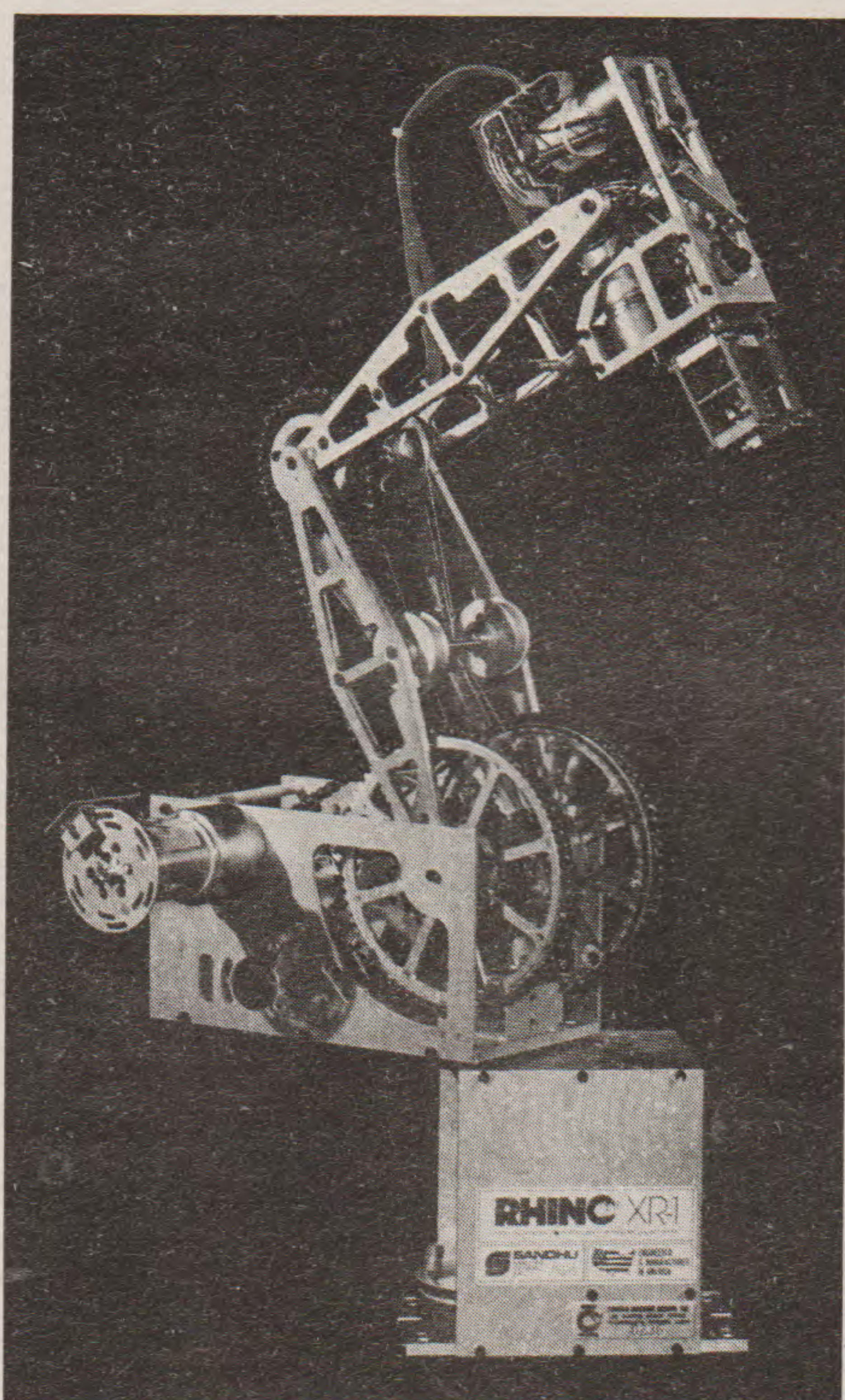
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- ☐ 690 dots horizontal resolution
- ☐ 16 colors
- ☐ .31 mm dot pitch tube
- ☐ non-glare, black matrix
- ☐ plugs directly to IBM PC

\$795.



Princeton Graphic Systems' new HX-12 high resolution color monitor is designed with an NEC.31 mm dot pitch CRT to give you up to 690 dots horizontal resolution. You need not compromise the display quality of your system with monitors rated at less than the 640 horizontal dots generated by your IBM PC. The PGS HX-12 delivers 16 super colors, 80 characters x 25 lines. It is the best price/performance PC direct drive monitor in the market today. Get the PGS HX-12 and discover for yourself how well it complements your IBM Personal Computer.

phic	Systems	High	Resolution	80	character	HX-12	RGB
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phic	Systems	High	Resolution	80	character	HX-12	RGB
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phic	Systems	High	Resolution	80	character	HX-12	RGB
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phic	Systems	High	Resolution	80	character	HX-12	RGB

80 character display

**PGS**

**Princeton  
Graphic Systems**

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Circle No. 50 on Inquiry Card



**Discover BASIC: A Student's Guide to Problem Solving in BASIC**, by Rick Thomas. 94 pages, \$5.95 (softbound). Sterling Swift Publishing Co., Austin, TX.

Used in conjunction with "Discover BASIC: Problem Solving with the Apple II Computer," this workbook has eight units: Output, Numeric Variables; Decisions; Look the Loop; String Variables & Graphics; Simulation; Color Graphics; and Lists and Tables. Each unit introduces the student to its objective and leads logically, smoothly to more sophisticated applications in the next unit. It begins with demonstration programs followed with reading assignments. Next in each unit are written exercises and simulation runs. The student then selects one of the problems presented in the unit (or writes his own) and writes a program to solve the problem on the computer.

**Circle No. 135 on Inquiry Card**

**Educational Software Directory: A Subject Guide to Microcomputer Software**, compiled by Marilyn J. Chartrand and Constance D. Williams. 292 pages, \$22.50, Corporate Monitor, Inc., Littleton, CO.

Now that many schools are utilizing computer technology to support the educational objectives of the school, there is an overwhelming need for access, by subject, to the abundance of software being produced. This directory not only provides excellent subject access to this software but also offers additional information which will be of significant value to educators.

The directory contains information on over 900 software packages (more than one program sold as a set) and programs for as many different microcomputer systems as can be identified. Part One of the directory contains the listing of the software, arranged alphabetically. Software included fall into three types: programs used by students; software used to create programs for students; and

programs used by the teacher for demonstration purposes. Each entry includes the name of the software package or program, publisher, grade level, format, hardware requirements, programming language, price and a lengthy annotation. The second part contains the publisher and distributor listing, including the name, address, phone number and a description of the company's products

and previewing policies. An annotated bibliography of sources which will aid in implementing computer-assisted instruction in the curriculum is contained in Part Three.

Another feature of this sourcebook is its specific subject index, which can be used in conjunction with curriculum planning. An index by title is also included.

**Circle No. 133 on Inquiry Card**

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For professional tape users, it used to be that stepping down to half-inch video tape also meant stepping down in color quality.

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But the advantages of our half-inch tape go beyond color. You'll also get professional recording features like fewer dropouts, low headwear and extended

stop motion capability. The same characteristics that have made our 2", 1" and 3/4" tapes the leaders in the professional market.

New packaging plus a convenient labeling and hanger/storage system make our half-inch tape professional right down to the last detail.

But to get the true picture of our improved half-inch videocassettes you just have to try them. They're available in both Beta and VHS

formats from your authorized dealer of Scotch Video Tape.

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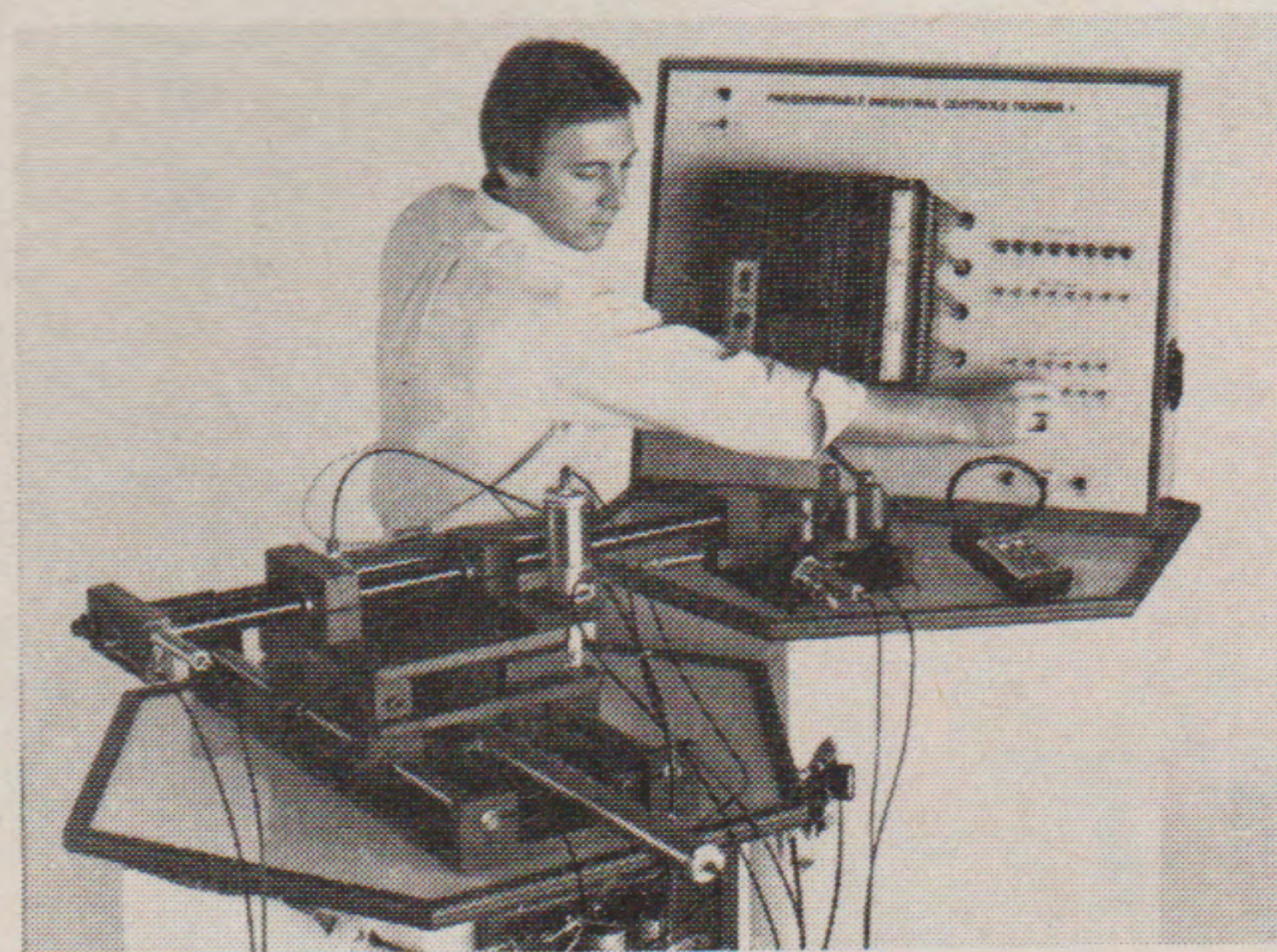
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# Software & Courseware



**Robotics Training:** A job-related robotics training program designed to educate and train robotic application technicians will be available to vocational/technical schools, junior colleges, major manufacturers and others interested in establishing a robotics training program. The Lennox Robotics Training Program teaches students to select, program and assemble robots. Students also receive instruction in maintaining and troubleshooting robotic installations. Instruction materials consist of manuals, video cassettes, and overhead transparencies. The robotic equipment available includes single arm, double arm, box arm, D.C. servo-robots, and hydraulic servo-robots. The course also utilizes manual control switch boxes, programmable controller trainers and industrial or process control computers. The program is structured for easy integration into existing Electro-Mechanical, Process Control and Engineering or Mechanical Technology programs. *Lennox Education Products, Dallas, TX.*

**Circle No. 312 on Inquiry Card**

**User-Friendly Model For Apple II and Apple II+:** Model II features complete menu-driven software with user prompts at all levels of command entry and keyboard dialing for ease of operations.

It does not require the use of a serial interface card. It plugs directly into one of the I/O slots inside the computer for full or half duplex communications at either 110 or 300 bits per second. Software compatible with other Apple II smart modems, this unit provides crystal-controlled, digital transmission and reception of data to other Bell 103-type equipment with a high degree of accuracy.

It is equipped with firmware for direct communications from a "bare bones" computer and comes with a software disk containing various utility programs including the terminal program. This FCC-registered unit is also equipped with a built-in speaker to allow audible monitoring of call progress as well as auto-dial and auto-answer. *Multi-Tech Systems, Inc., New Brighton, MN.*

**Circle No. 308 on Inquiry Card**

**Write-On!:** is the easiest to use word processing system for any Apple computer. The human engineering designed into the system assures that a student, secretary or instructor can master it in less than one hour. The Write-On! user's manual is a series of step-by-step lessons on the use of the system's many powerful features and contains specific examples showing how to use them. The examples mentioned in the text are included on the Write-On! diskette and the user's manual has a complete table of contents, index and pullout quick reference card. Listed are some of the features which make Write-On! the practical solution to many writing needs: edit the text using simple, easy to remember commands ("C" means Change, "I" means Insert, etc.), set a moveable "outline" left margin, with up to 10 levels of indentation, string together up to 100 files on several diskettes when printing (a 700 page novel can be printed in a single run) and read, edit and print text files created by other programs or word processing systems. *Datamost, Chatsworth, CA.*

**Circle No. 179 on Inquiry Card**

**Quadratic Equations Courseware for the TRS-80®:** The new Quadratic Equations courseware (26-2623) offers practice in solving quadratic equations to secondary and college-level math and science students using the TRS-80® microcomputer. It allows students to select practice problems from five areas — equation recognition, coefficient recognition, discriminant evaluation, determining the type of roots and evaluation of roots. The program offers positive reinforcement for correct answers and hints for a second try in the event of incorrect answers. Score reports are provided to enable students to track their progress.

The accompanying program manual has a User's Guide to introduce the student to the program with a hands-on demonstration plus a Concepts section which offers a review of math concepts required to use the program.

Quadratic Equations requires a TRS-80 Model I or Model III 16K tape system or a Model I or Model III disk system with a minimum of 32K and is compatible with the Radio Shack Network systems. *Radio Shack, Fort Worth, TX.*

**Circle No. 314 on Inquiry Card**

## **MANMAN On VAX Series:**

Turnkey manufacturing information systems are now being supplied on DEC minicomputers. A manufacturing and financial software system known as the MANMAN Information System currently runs on the HP 3000 series and is now offered to run on VAX series of 32-bit superminis as an additional line of hardware. It has been completely rewritten to operate on the VAX system in native mode and uses DEC's database management system, DBMS 32. To the user, however, the system performs identically as it does on the HP 3000, where it uses HP's IMAGE database manager. *Ask Computer Systems, Inc., Los Altos, CA.*

**Circle No. 307 on Inquiry Card**



# INTRODUCING REAL-WORLD COMPUTER EDUCATION

Now you can add a dynamic real-world dimension to your computer curriculum.

Focusing on real business situations, Digital Equipment Corporation has produced a series of video-based computer courses that are highly involving. They bring your students face to face with computer technologies as they are actually applied in business and industry today.

Computers are presented not as the complex devices of programmers and analysts but as tools for managers, giving your students the broad business perspective they need. A wide range of topics is covered—from basic computer concepts and terminology to state-of-the-art applications in subject areas like programming and office automation.

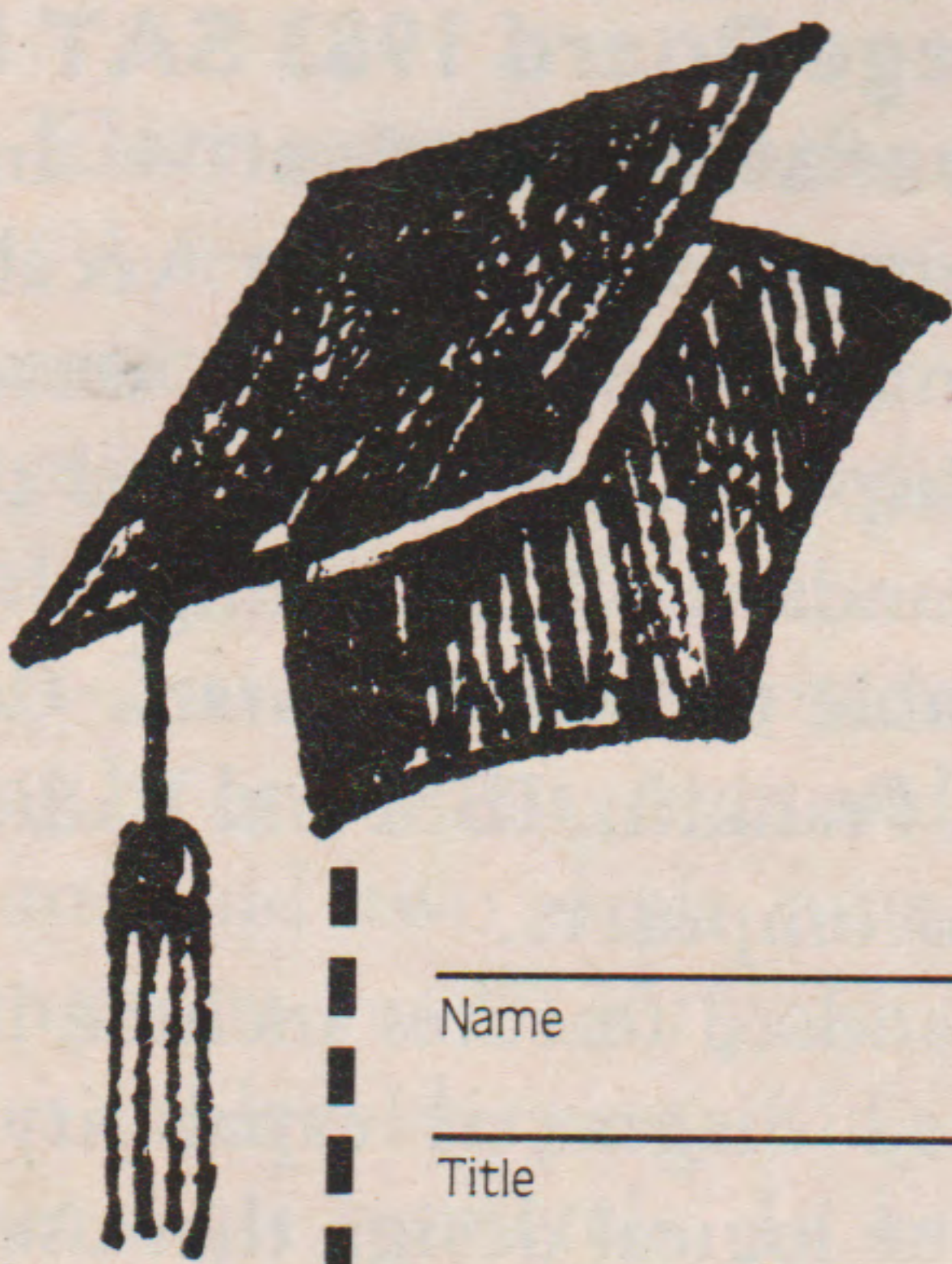
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graphics make the learning experience fast-moving, stimulating and highly visual. Videotapes are supplemented with detailed reference books. Both are designed in a modular format to give you maximum flexibility in curriculum planning and scheduling.

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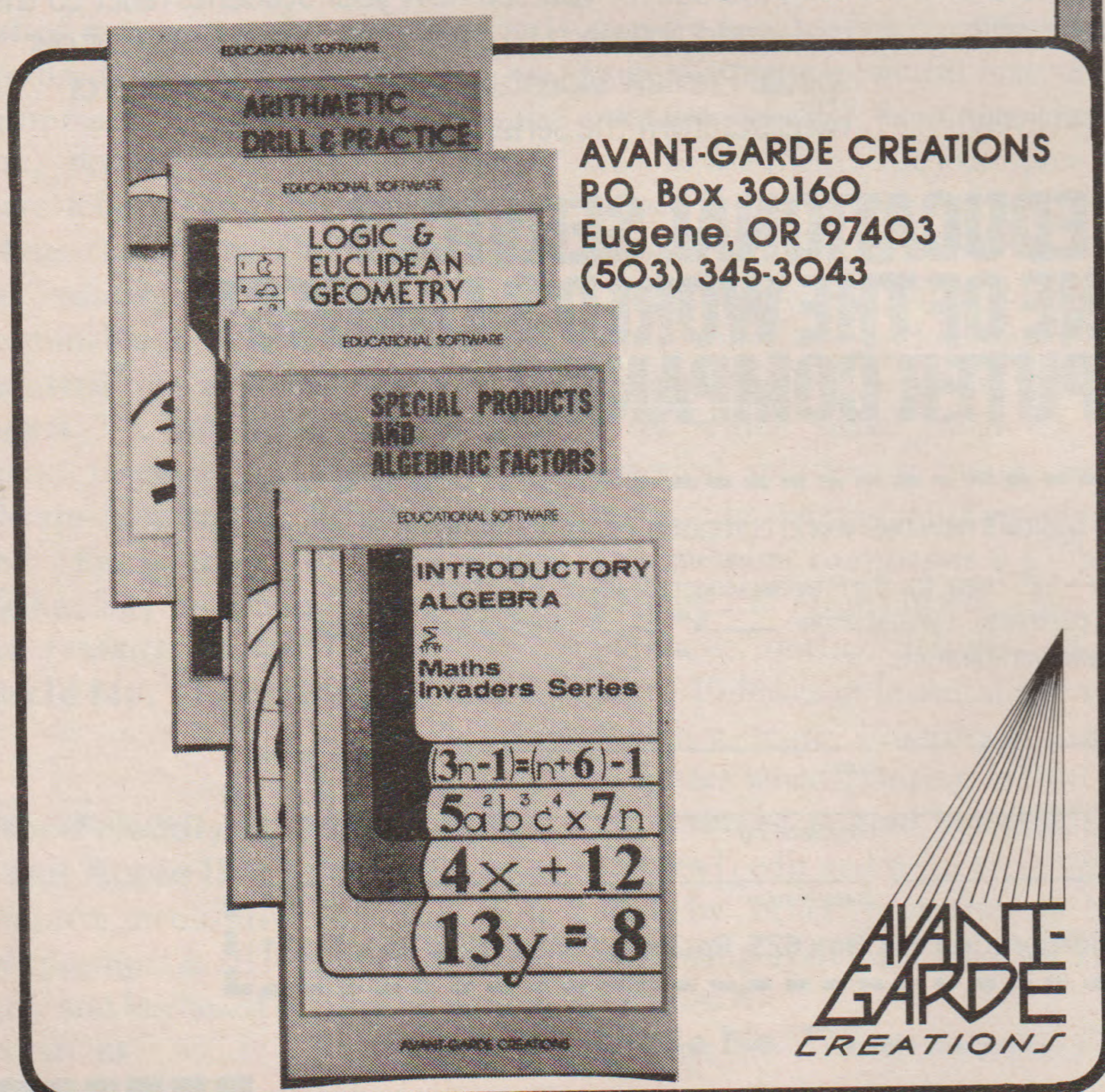
## ARITHMETIC DRILL AND PRACTICE

Practice 4 mathematical functions individually or in combinations, and race with time. A playful way to learn. **\$15.95.**

## LOGIC AND EUCLIDEAN GEOMETRY

Teaches 9 main forms and exceptions and offers exercises on angle logic, picture/symbol logic, mixed or random. Also gives brief history. **\$29.95.**

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## TK!Solver and TK!SolverPacks:

TK!Solver is an interactive personal computer product that solves engineering and business problems without programming. The program allows the user to set up problems, vary assumptions, find solutions, and display results. All facilities needed to solve the problems are built-in and need not be developed by the user. TK!SolverPacks are application packages for use with the TK!Solver program. Each contains several pre-defined models to solve particular problems in a given field. Each has pre-set equations, tables, and values for solving that particular problem. *Software Arts, Inc., Wellesley, MA.*

**Circle No. 279 on Inquiry Card**

## Motivational Film For Handicapped Children: HI, I'M DAN,

a new 9-minute film designed for both handicapped and non-handicapped children, is the story of a young, hearing-impaired boy and his attempts to join in regular playground games with the neighborhood children. Presented without one word of dialogue, the film illustrates the importance of determination and desire in overcoming a handicap, while demonstrating to non-handicapped children that the capabilities and problems of their handicapped peers are highly similar to their own. *MTI Teleprograms Inc., Northbrook, IL.*

**Circle No. 286 on Inquiry Card**

## College Board 1983 SAT Exam Preparation Series

— Includes 42 programs covering vocabulary, reading comprehension, word relationships, mathematics and the test of standard written English. It is available for Apple, Atari, Commodore, Franklin, IBM and Radio Shack microcomputers.

Standard features include individualized diagnostic capability and a unique logical design that uses artificial intelligence techniques to customize exam preparation for each individual user. *Krell, Stony Brook, NY.*

**Circle No. 172 on Inquiry Card**

**Circle No. 64 on Inquiry Card**



### **Solving and Graphing Functions:**

Ultra Function Plot enables the user to create and print out graphs of arithmetic functions by inputting a formula and the type of graph desired. Options of graph types include sine, cosine, line graphs, parabolas, quadratics, polynomials, bell curves and more. The system will also calculate asymptotes, areas under a curve, intersection of two curves, X and Y Tables and solutions to equations. Ultra Function Plot requires an Apple II Plus 48K. *Avant-Garde, Eugene, OR*  
**Circle No. 275 on Inquiry Card**

**The Draftsman:** A general graphics program for the IBM PC, it makes it fast and easy to produce presentation quality charts and graphs. It can generate standard graphs with minimum input from the user. Screen images can be in a variety of formats, including VisiCalc DIF files. The Draftsman is user-friendly. All input is via menus. No special language or command syntax needs to be learned. The entire user manual is stored on disk and can be viewed either sequentially or at random. Help (function key 10) can be entered at any time for specific information relating to the task at hand. Designed strictly for use on the IBM PC, it runs with 64K of memory (128 is recommended), a color/graphics monitor adapter and two disk drives. *Starware, Washington, DC.*

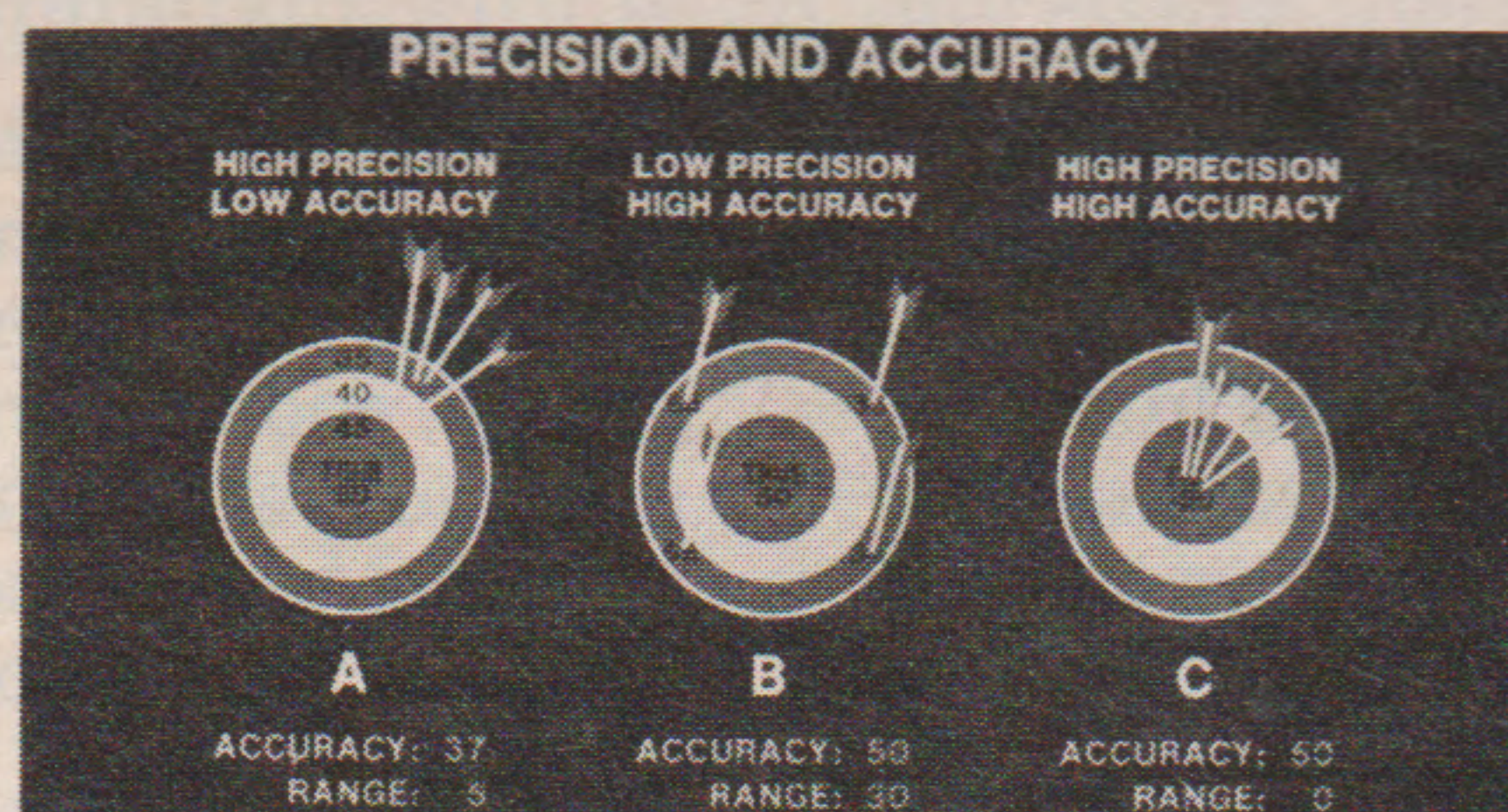
**Circle No. 196 on Inquiry Card**

### **New Elementary Math Programs:**

A series of 8 new elementary mathematics software programs for the Versator educational computer include: Counting Patterns I for grades K-2 which provides practice in counting by ones, tens, fives and twos using one and two digit numerals; Counting Patterns II, for grades 2-4, advances the level by presenting three and four digit numerals. In both of these programs, students supply the missing numeral in a sequence of three to six numerals. Number Patterns provides students in grades 2-6

with practice in recognizing missing numbers in increasing and decreasing numerical sequences utilizing one to nine increments. Comparing Numbers I and II, which provide drill and identifying numbers that are greater than or less than other numbers, is for grades 1 to 6. These two modules require skill in addition, subtraction, multiplication and division. Also included in each program are lessons in identifying odd and even numbers. Place Value I and II, for grade levels 1-3 and 3-5 respectively, include identifying placement of numbers in the ones, tens, hundreds and thousands position. Number Concepts provides practice for K-2 students in identifying corresponding symbols and numbers, reading numerals and recognizing and identifying ordinals. *Centurion Industries Inc., Menlo Park, CA*

**Circle No. 192 on Inquiry Card**



### **Audiovisual Training Program In IR Spectroscopy:**

The training program IR-101, *Principles of Infrared Quantitative Analysis*, is available in either slide/tape or videotape format. It describes a systematic approach to performing quantitative analysis in solution. It discusses measurement errors and their effects on precision and accuracy. Multi-component determinations are illustrated with the analysis of a five-component mixture. *Savant, Fullerton, CA.*

**Circle No. 303 on Inquiry Card**

### **Self-Study Training Course:**

A computer-aided instruction self-study course, this training program uses the IBM personal computer to teach the functions, features and operation of the computer. It quickly provides IBM personal computer users with an understanding of the

system and its capabilities. It is designed for professional people, small business managers, corporate executives, managers and others with or without data processing knowledge. The package consists of six stand-alone, self-paced learning modules, or courses, each of which is easy to understand and use. Course titles include: Major System Components, Using the Keyboard of the IBM Personal Computer, Basic Computer Concepts, Using the BASIC Computer Language, The Disk Operation System (DOS) and Problem Determination. In addition to the six CAI course modules, the package contains a 143-page workbook and a ready-reference checklist of the steps to be followed for using the courses on the IBM personal computer. The workbook can be used as a study guide between training sessions and as an ongoing reference source. *Computer Systems Research, Avon, CT.*

**Circle No. 178 on Inquiry Card**

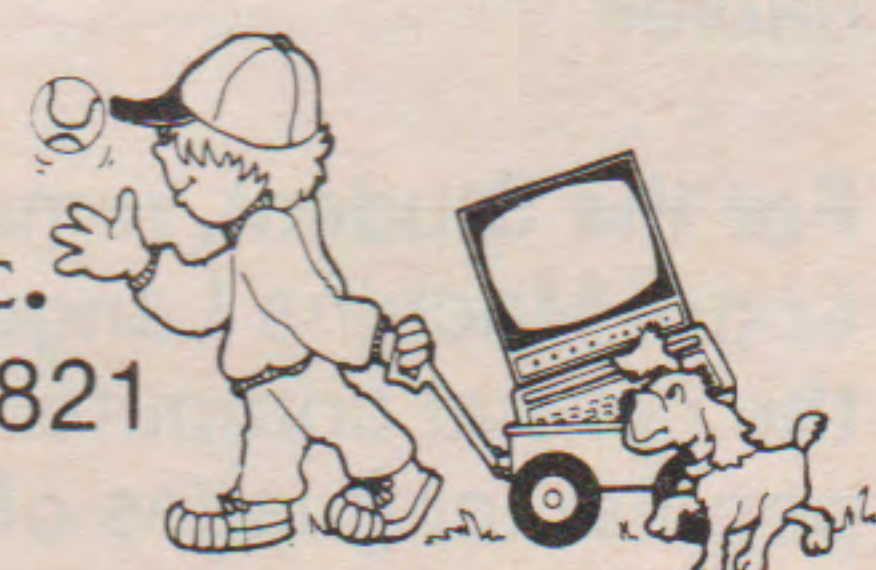
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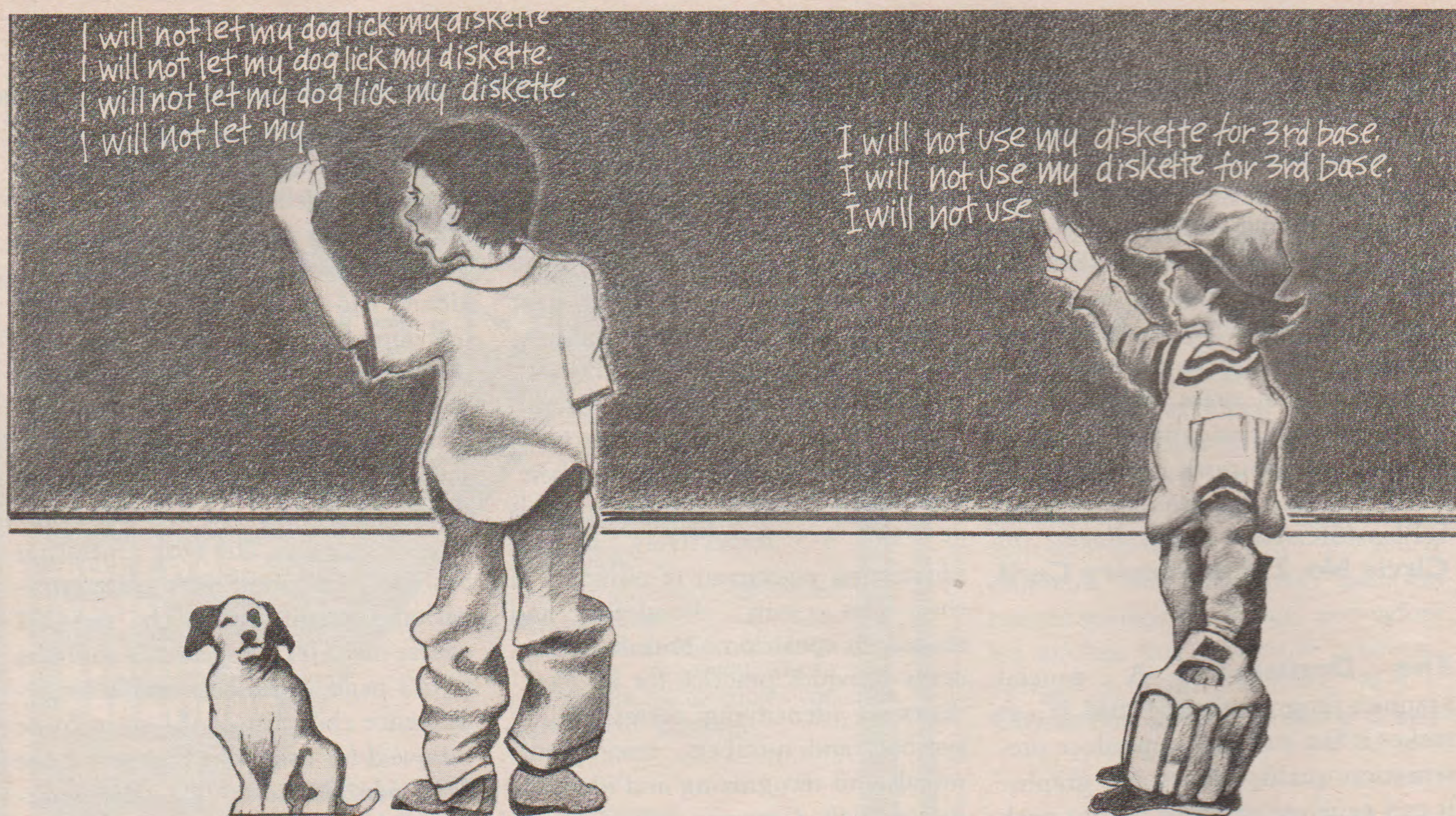
EDUCATIONAL SOFTWARE FOR APPLE II®

**Hartley Courseware, Inc.**  
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**Circle No. 75 on Inquiry Card**





# To punish or not to punish . . .

If detention was made the "industry standard" punishment for mishandling diskettes, there would be a lot of adult computer professionals staying after work. Any way you look at it, bad disk care is expensive. Floppy diskettes are expensive from the start, and their value grows as information is added to them. Disk drive problems can make your computer expensive in maintenance and loss of valuable programs.

**Alternatives.** There is now a way to network Apple II computers so that the only workstation requiring a drive can be placed on the instructor's desk. Networking has long been a term associated with very large and advanced computer systems. The term refers to the interconnection of multiple display terminals to a central intelligence or host. These same features are now scaled down to the personal computer level.

At a cost way below that of individual disk drives, the Remote Operating System from Softworks allows up to 127 users to utilize disk storage from one central computer. The central Apple can accommodate from one to eight floppy diskette drives, or various popular hard disk drives made for the Apple.

**For the Instructor,** life is made easier by allowing all system utilities and configurations to be performed from the central computer. You can simply use the central Apple and its disk storage to handle all requirements for loading, saving and running programs. Running only one diskette provides more program control as compared to loading multiple copies into each separate system. And your main Apple can either monitor activity, or be cleared for normal operation with two keystrokes.

The central computer contains a 3" x 5" circuit card through which the Remote Operating System is loaded and transferred to the remotes. The remotes, each containing a Remote Circuit card, are connected to the central Apple in a daisy chain via cables.

**For the Student,** remote computers have access to Applesoft, Logo, Machine Languages, Integer programs and data files at the central computer using standard DOS commands. Soon the popular languages of CP/M®, Pascal and FORTH will also be added.

Apple & Apple II are registered trademarks of Apple Computers.  
CP/M is a registered trademark of Digital Research

Logging on to the remote system requires entering a User Password which enables access to the network, determines what part of the system's data storage will be available to that station, and triggers a Turnkey Command which automatically runs the first program. Simultaneous access attempts are handled by a wait mode until the disk becomes available, or the user cancels his command.

Students enjoy full access to standard DOS commands (with the exception of INIT) plus additional commands and utilities unique to ROS:

- FEED for mass loading one program to multiple remotes simultaneously.
- A simulated "in-use light" signals disk activity or wait mode status so the user can tell what is happening even when the disk drive is out of sight.
- All standard DOS error messages and recovery are implemented plus special messages unique to the network.
- A system utility program called SPEED which makes access to data on floppy diskettes almost as fast as a hard disk. This also reduces wear and tear on fragile disk drives.

**For everyone,** set-up software is provided with the system software. Among the other advantages are that the future expansion of system capabilities can be made through software only, and that printer output is not restricted to the host Apple, but rather is available from both the central and remote computer.



7741 E. Gray Rd., Suite 2  
Scottsdale, Arizona 85260

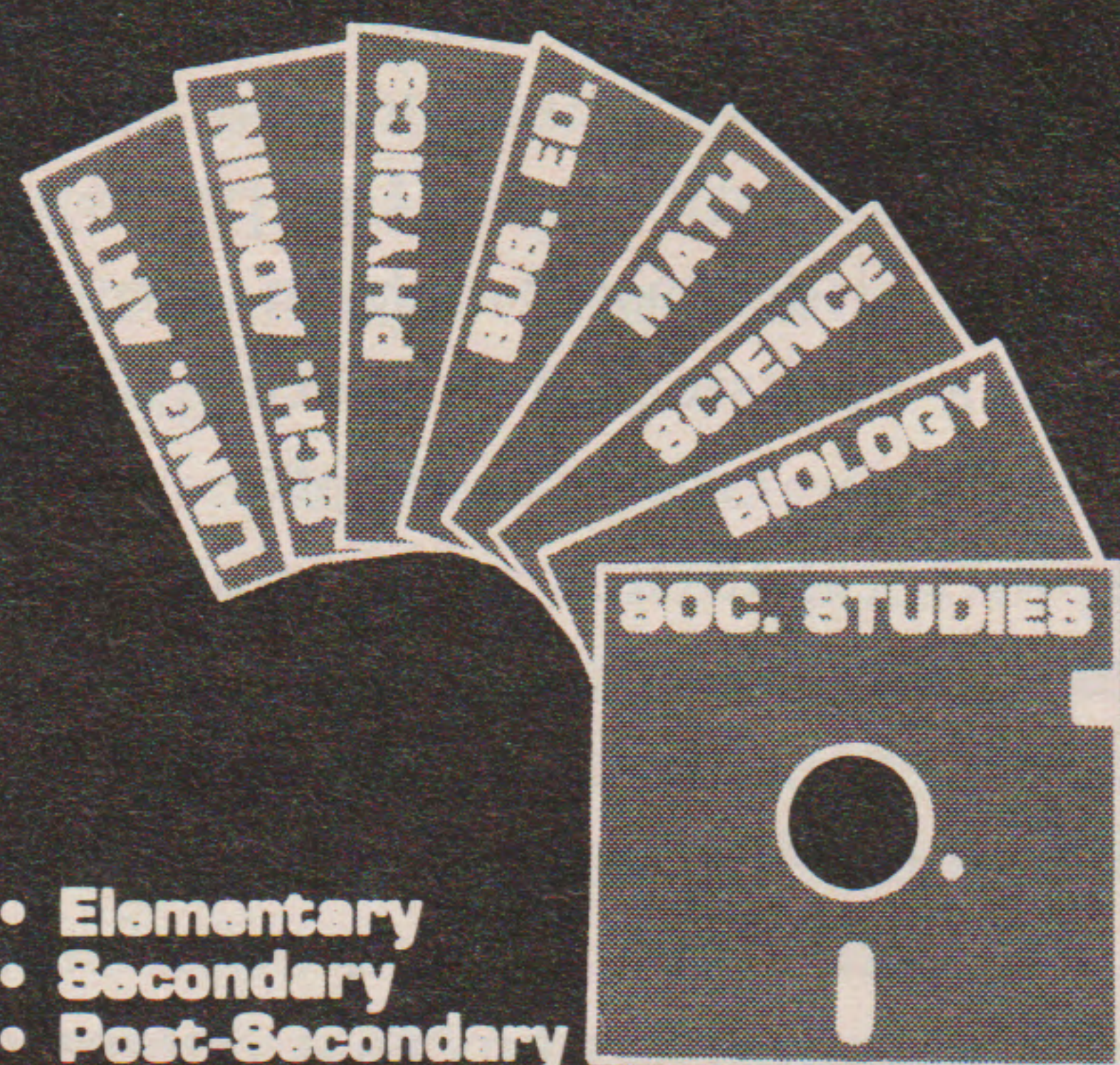
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Circle No. 61 on Inquiry Card

**Language for Atari:** Tiny-c provides an easy-to-use, easy-to-modify programming environment for suitably equipped Atari home computers. It requires 48K of RAM and at least one disk drive. Tiny-c includes the portable Program Preparation System for ease of software development. The package includes a comprehensive user's guide which serves both as an introduction to structured programming and as a Tiny-c reference manual. *Optimized Systems Software, Inc., Cupertino, CA.*

Circle No. 199 on Inquiry Card

**BUILT-IN LINE SWITCH:** Designed for high speed, wide range protection against equipment malfunctions and data losses caused by power line surges, the Surge Sentry features a built-in on/off master switch for conveniently activating the unit's six receptacles.

Responding to surges within picoseconds and with rated dissipation of 1,000,000 watts at 100 micro-seconds, this model has the fastest response and widest overvoltage absorption capability of any such device. The compact unit also has the ability to clamp any voltage rise of more than 15% above peak nominal.

It incorporates a neon monitor light that signals any condition other than performance at full specification. Because the SurgeSentry operates in parallel with the power line and is not load-bearing, downline equipment continues to operate unharmed should the unit cease to function. *RKS Industries, Scotts Valley, CA.*  
Circle No. 350 on Inquiry Card

**TaskMaster:** is a single software program with word processing, data communications, database management, telexing typesetting, printable bar graphics and on-screen math capabilities.

TaskMaster's list processing supports sort, select, merge and label printing functions. The data communications facility supports asynchronous ASCII communications up to 19.2 K baud. The database manager allows selection of specific records, fields within specific records, calculation on those fields or records and tabulation of specific records or fields. It also allows the creation of database files from WP files and vice versa.

The word processor features on-screen calculation, proper handling of superscripts and subscripts in scientific notation, true proportional spacing, a multi-level hyphenation facility with an internal prefix and suffix dictionary, and fast execution because it is written in Macro-11 to utilize core memory. The next release will feature virtual core memory to allow very large files. TaskMaster supports a variety of terminals and many different printers. *Dawn Computer Corp., Studio City, CA.*

Circle No. 311 on Inquiry Card

**Plato Computer Literacy — Introduction:** This lesson is a foundation for a full curriculum in computer literacy or simple programming. It gives a brief introduction to the history, uses and issues surrounding computers in today's society, pre-



sented in a friendly, non-intimidating manner with touches of humor and simple supportive graphics. Designed for junior or senior high and vocational school students. *Control Data Publishing Co., San Diego, CA.*

Circle No. 313 on Inquiry Card

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Circle No. 4 on Inquiry Card



**Computer-Assisted Instructional System:** A software system for schools and industry that allows non-programmers to develop courses, the CAN-8 was designed for use on a Honeywell DPS 6 small computer and can accommodate up to 128 simultaneous users. CAN-8 is adaptable to the needs of schools at all levels, from grades to college. The DPS 6/CAN-8 instructional system is a tool for academic instructors and training directors facing the sizeable task of rapid development of course materials to meet a wide variety of student needs. *Honeywell, Inc., Waltham, MA.*

**Circle No. 200 on Inquiry Card**

**The Apple Grade Book:** The revised edition of this book, version 2.5, is now available. The new features of this K-college grade management system includes an optional

grade weighting system, an elementary school option of keying in names once for a series of subject areas, class size to a maximum of 80 students and up to 35 activities per student. Also new is the availability of obtaining a listing of students absent from tests and other activities. *J&S Software, Port Washington, NY.*

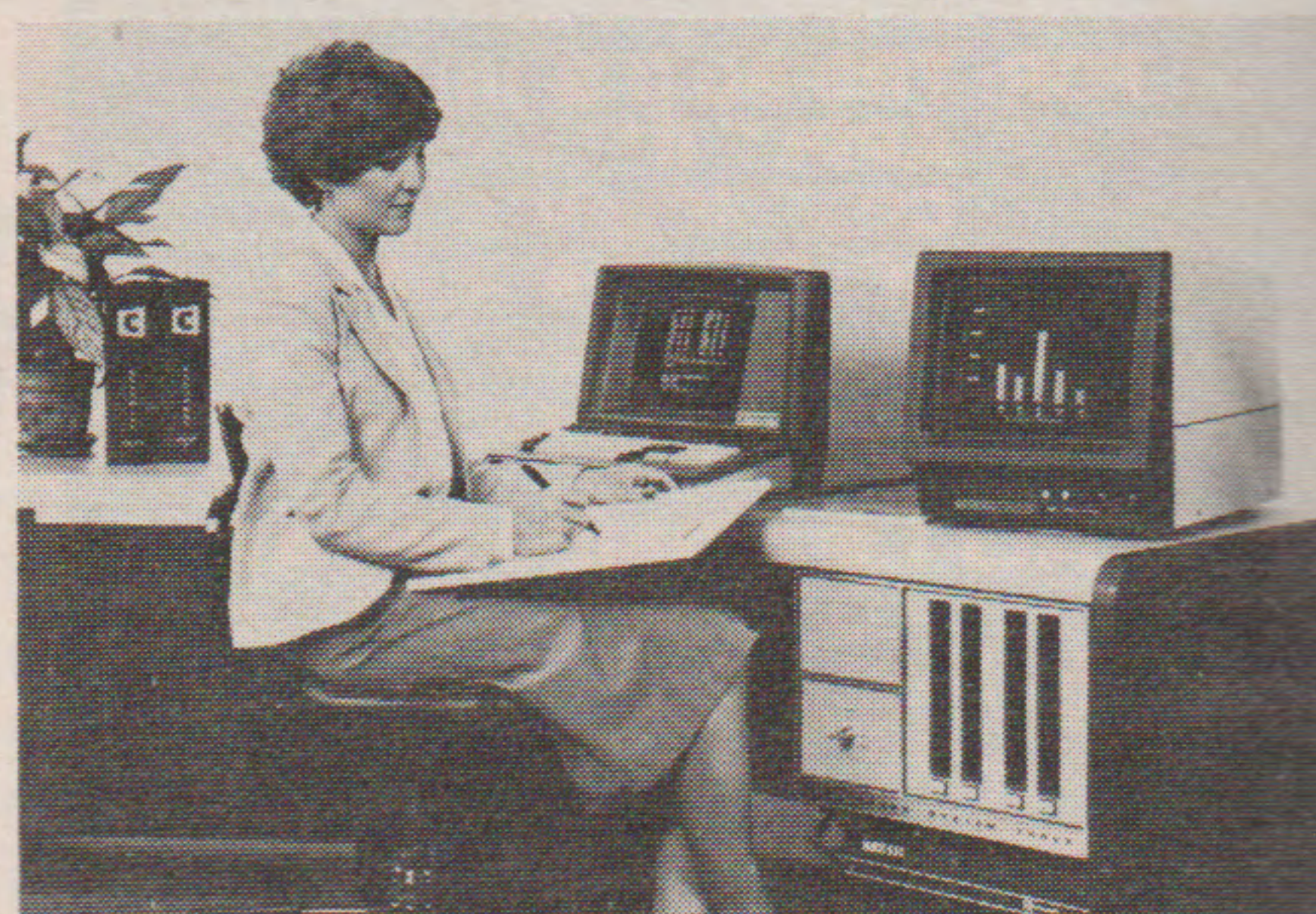
**Circle No. 292 on Inquiry Card**

**Computerized Resume Preparation** — Interactive Resume, available for Apple, TRS-80, CP/M and IBM PC owners, provides a fast reliable tool for upgrading resumes. Resumes can be tailored to meet the needs of each particular job opportunity. Interactive Resume is user-friendly and through a series of special questions resumes are built automatically. *Single Source Solutions, Concord, CA.*

**Circle No. 165 on Inquiry Card**

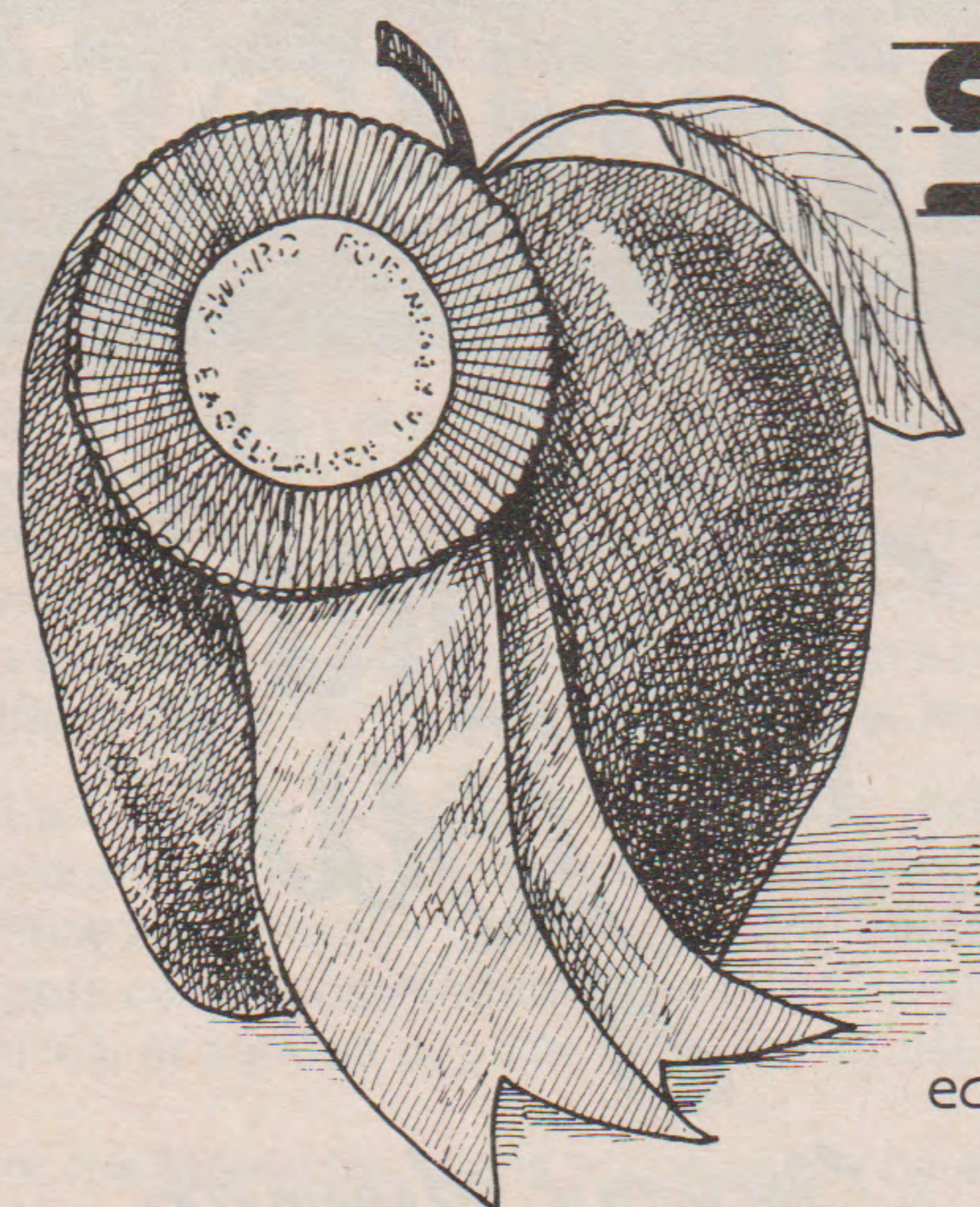
**User-Oriented Graphic Software** — This high resolution, color graphics systems with a variety of sophisticated, user-oriented software packages can be used to display color or black-and-white images with up to 754 x 482 point resolution on a high quality RGB monitor. The packages include: Slidemaster, which allows a user at a workstation consisting of any Cromemco microcomputer with graphics capability and a digitizing tablet and pen to create images interactively; Fontmaster, a character generator software package, allows a user to interactively design his own fonts; and a graphics system that decreases programming time. *Cromemco, Inc., Mountain View, CA.*

**Circle No. 176 on Inquiry Card**



**Quic-N-Easi AG:** is a complete and thoroughly documented new method of writing applications without programming. When using Q-N-E, it really will be programming, but not in the usual tedious way. The fill-in-the-blanks method of programming introduced by Q-N-E is so straightforward that the average business professional can use it immediately — without any prior computer experience. The skill level required to create custom application with this method is about the same as is needed to use a word processor or a spread sheet program. In this system, there is no difficult computer language such as BASIC to learn, no confounding computer hocus pocus to master as in Database Managers and no boring questions like so-called program generators make you answer. *Standard Microsystems, Inc., Lanham, PA.*

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**Savvy Personal Language for Apple II**

— Savvy Personal Language system using an adaptive pattern recognition processor comes with complete instructions and the following applications: general ledger, accounts receivable, accounts payable, payroll, mailing list, document writer, inventory control with more to follow. With Savvy, a user is able to utilize his own language to develop all system commands, utilities and programs. All programs are self-loading, self-relocatable and serially reusable. All are available on a global basis. *Savvy Marketing International, San Mateo, CA.*

**Circle No. 155 on Inquiry Card**

**Early Childhood Package:**

Nursery Time, For Apple II, is an open-ended book for ages 3-9, which develops literary appreciation and verbal fluency. This two-sided disk incorporates a variety of graphics, color, animation and music in a total of 124 routines. A thirteen page booklet suggests related learning activities in many areas including the alphabet practice built into the program. *Mary Bee Communications, Omaha, NE*

**Circle No. 194 on Inquiry Card**

**Cassette Personal Program Copy Service:**

With the introduction of such personal computers as the Commodore VIC-20, Heath and others, the need for inexpensive storage media, namely cassettes, is growing rapidly. Magnetic Information Systems is now offering a cassette personal program copy service to the mass personal computer user market. The prime purpose of offering this service is to be in a position to supply various clubs and individuals with a high quality computer program duplicator service at an affordable price. This service will begin on a mail order basis, primarily servicing the various computer clubs, thus allowing club members to interchange libraries of programs. *Magnetic Information Systems, Shelton, CT.*

**Circle No. 293 on Inquiry Card**

**Advanced Math Package for IBM Personal Computer:**

muMATH/muSIMP, a symbolic mathematic package is available for the IBM Personal Computer. muMATH/muSIMP is for students, mathematicians, scientists and engineers who need mathematically sophisticated approaches to problem solving. muMATH allows users to utilize complex math functions such as integration, differentiation, factorials, base conversion and exact rational arithmetic, with over 600 digits of accuracy. The package can evaluate and simplify expressions containing variables that have not been assigned. muSIMP is the language muMATH is written in, especially designed for computer algebra systems. muSIMP will allow users to modify the muMATH package to their particular needs. The package is offered for the Apple II, TRS-80 and CP/M-80 computer systems. *Microsoft, Corp., Bellevue, WA.*

**Circle No. 198 on Inquiry Card**

**Commercial Graphics for VAX's:**

D-Pict/B is a business graphics package for non-data processing users of DEC VAX computers. It utilizes an interactive menu approach to allow the user to produce bar charts, pie charts and line charts in as few as two instructions. Once a chart definition has been created, it can be recalled later for use with new data. Output from accounting and financial planning packages can be easily adapted to D-Pict/B. The package can be used with a wide variety of color and black-and-white graphics terminals. *Interactive Systems, Inc. Burlington, MA.*

**Circle No. 160 on Inquiry Card**

**Special Software for Educators:**

EASYQUIZ and EASYLESSON are classroom aids that help teachers design and administer tests and quizzes. Educators will also use LOGO and

PILOT, two computer languages used extensively in classrooms, as well as PASCAL. Commodore is also engaged in an enormous international effort to collect thousands of public domain software programs written for the PET series computer, and convert those programs to work on the Commodore 64, PET, CBM and SuperPet computers. The software will be made available for duplication through Commodore full-service dealers and Education Resource Centers. *Commodore Business Machines, Inc., Wayne, PA.*

**Circle No. 315 on Inquiry Card**

**Color Graphics for IBM Personal Computer:**

The Draftsman, a general graphics program for the IBM personal computer, makes it fast and easy to produce presentation quality charts and graphs.

It can generate standard graphs with minimum input from the user. Screen images can be printed on the IBM or EPSON MX-80 printer. Data input can be in a variety of formats, including Visicalc DIF files.

Graph formats include all standard business graphs: pie charts, bar charts (including stacked and clustered bars), line graphs and scattergrams. Multiple plots can be placed on a single page. Graph size and placement is arbitrary. Blocks of text, titles and footnotes can be placed anywhere. Figures (such as logos) can be drawn on the graph and saved on disk. Graphs can be set up to run in "production" mode, thus allowing similar plots to be drawn with different input data. Furthermore, screen images can be edited directly.

The Draftsman is user-friendly. All input is via menus. No special language or command syntax needs to be learned. The entire user manual is stored on disk and can be viewed either sequentially or at random. Help (function key 10) can be entered at any time for specific information relating to the task at hand. *Starware, Washington, DC.*

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# INTERACTIVE VIDEO'S MISSING LINK DISCOVERED.

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## Voice-Based Learning System:

The system enables the user to communicate with a computer simply by talking to it in any language. The VBLS system microcomputer-based instructional tool incorporates speech recognition technology. The VBLS voice-based learning system has been invented to meet the needs of learners in various instructional environments (business, school, industry, home). The system employs voice-controlled methods basic to all levels of learning in any field. It is a non-technical, user



friendly, authoring system that meets universal instructional needs. The instructor/author determines the topic-specific educational materials—in any language. The method of content organization is also specified by the VBLS author (true/false, multiple choice, fill-in the blank, comparison). The self-paced, interactive VBLS environment is controlled by the user's voice. *Scott Instruments, Denton, TX.*

**Circle No. 306 on Inquiry Card**

## Structured Extension to the Applebasic Interpreter:

SIBASIC, "structured interpretive BASIC," provides an extension to resident Applebasic interpreters. SIBASIC allows nested macros with substitutive arguments, symbolic labels, include files, deletion of remark statements, no line numbers and ability to organize output at a specified line number. SIBASIC includes these commands: case of, if-then-else, while, repeat-until, do and print-using. Specialized error messages are included. *Single Source Solutions, Concord, CA.*

**Circle No. 282 on Inquiry Card**

**Write Away:** This advanced, professional word processing system includes some of the following features: the ability to hold 29,000 characters (approximately 90 sectors) in memory, search (and replace) through a 29,000 character file in 4 seconds, allow the user to create and use multiple commands throughout test creation and editing and delineate a section of text (or control characters) and place this into the text one or more times by hitting a single key. Write Away requires an Apple II Plus. *Avant-Garde Creations, Eugene, OR.*

**Circle No. 175 on Inquiry Card**

## Business Accounting Package for Apple II+ and Apple III:

Systems II EX for Apple II+ and Apple II (emulator mode) includes payables, receivables, general ledger, inventory, payroll and database. Optional modules are job costing and cycle billing. Most of the modules are available as standalones or configured in various combinations to suit the needs of the user. The system is available on the 5¼" diskette version, or Corvus hard disk. *Westware, Inc., Ontario, OR.*

**Circle No. 276 on Entry Card**

**NEW CP/M SOFTWARE:** Two products for computer based training now available are Torricelli Author: for easy creation of courses using Wordstar or Wordmaster editor's commands, and Torricelli School: for elegant presentation of courses created with Torricelli Author. Author and School are written in 8080 assembler language, they will run on 8080/8085/Z-80 systems with CP/M or MP/M. Memory size required is 48K. Industrial training courses and home self-improvement courses can be created with these programs. All Torricelli programs feature test and quiz pages, index pages for optional branching and a save feature to resume taking the course at a later time. *Answer in Computers, San Diego, CA.*

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# IT'S TIME KIDS STARTED USING STRONG LANGUAGE.



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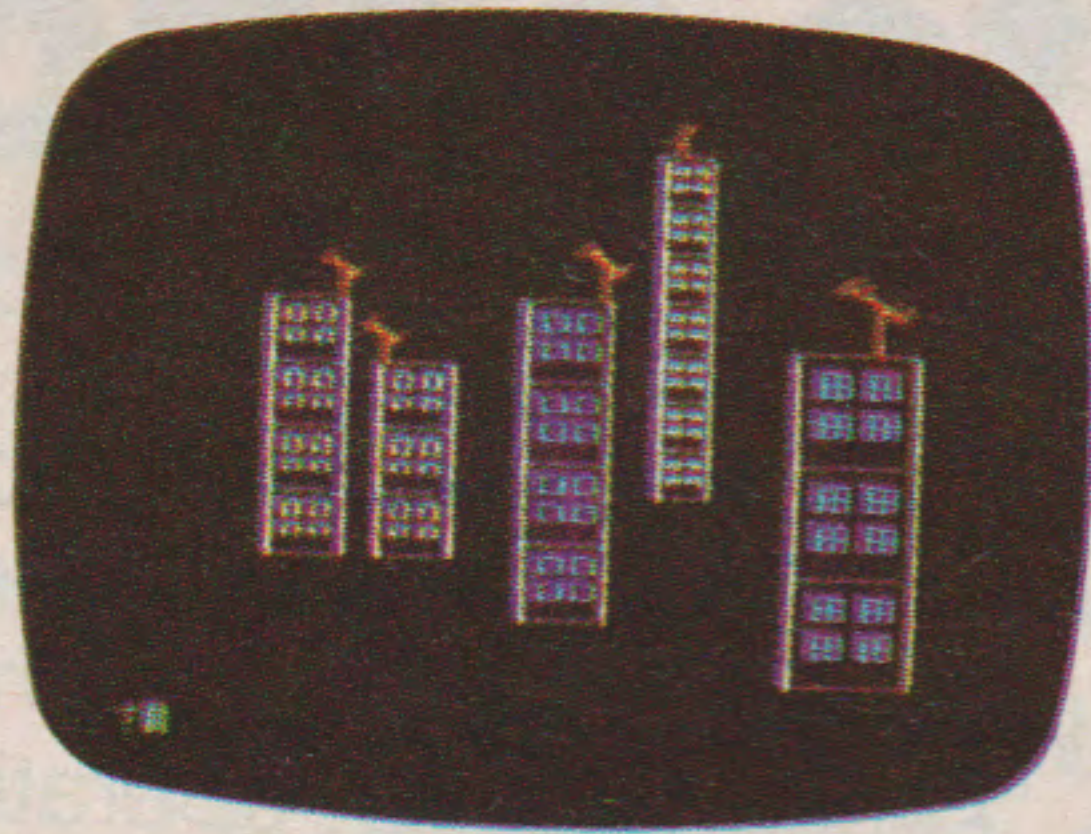
Because now the most powerful educational language is available on the Apple Personal Computer.

Presenting Apple Logo.

It's not just a programming language for computers, but a learning language for people.

Enough so that anyone, working with Apple Logo, can easily learn the programming principles once reserved for college courses.

Apple Logo encourages you to break problems into small steps, and then shows you how to make those steps automatic.



It does all this interactively. For instance, if you accidentally type "foreword," instead of forward, Apple Logo responds with "I don't know how to foreword."

There is no such thing as a mistake with Apple Logo, only logical statements telling you what needs to be done to make the program work. So the student programs the computer. Not the computer the student.

And as you learn, Apple Logo learns with you. So whether you're a student of 5 or 55, you'll always be challenged — but not overwhelmed.

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Apple Logo. It can make getting to know a computer the most positive of learning experiences.

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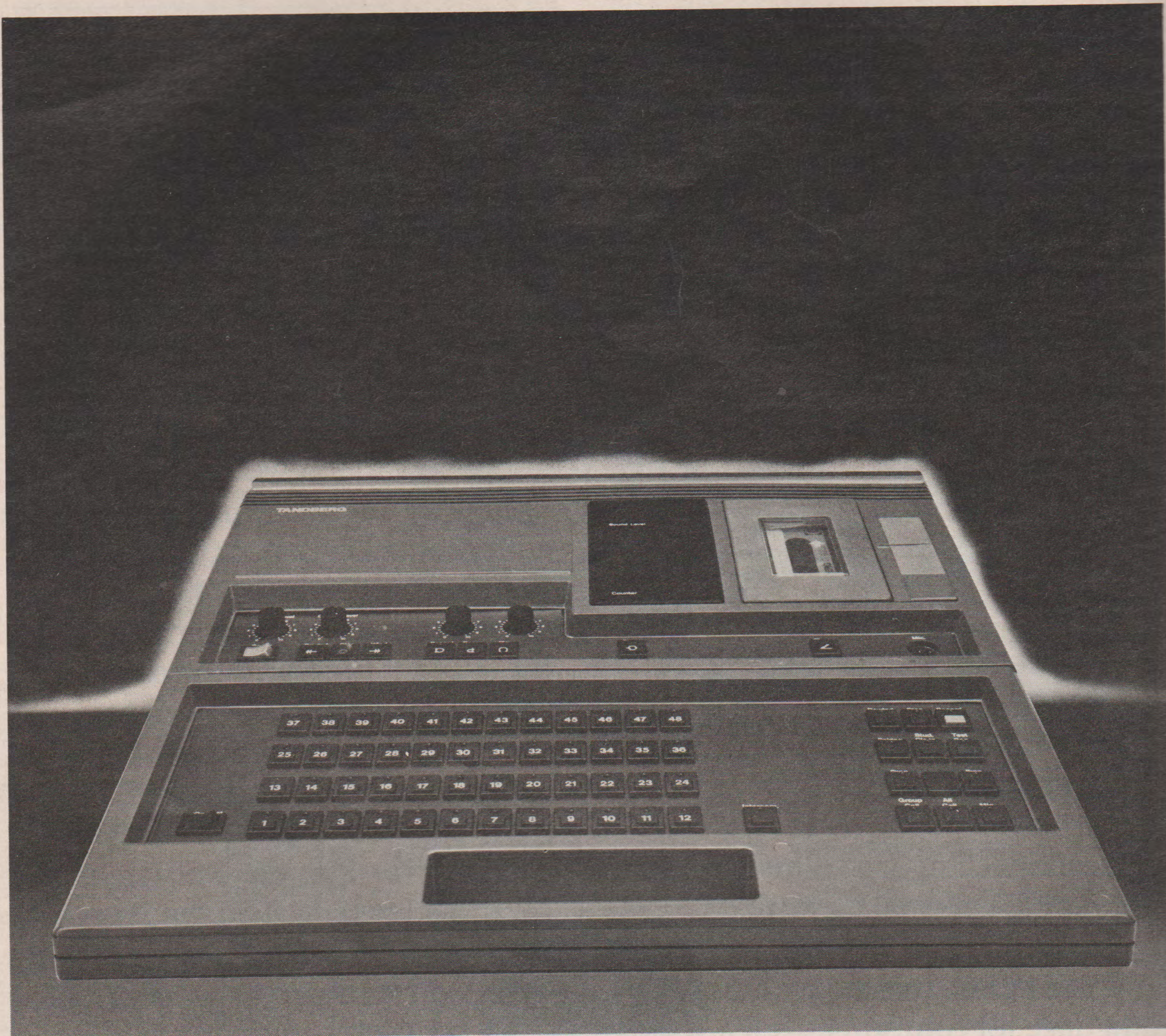
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Microprocessor control makes the System 500 a study in compact flexibility. And its electronic sophistication makes operation as simple as A-B-C. There are touch buttons for student selection, "smart" recap that automatically rewinds and seeks the beginning of the last sentence or phrase, a "real

time" digital counter that allows you to accurately find any passage...and all are grouped logically and conveniently for rapid, "second nature" operation. Best of all, the System 500 is designed for long life. Proven heavy duty tape transport, maintenance-free electronic switching, LED indicators that never burn out and plug-in component boards all simplify and reduce servicing.

The companion student recorders utilize the same proven tape transport and microprocessor control system. New headsets and student units have also been designed to complete this advanced, integrated system.

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# **TANDBERG**

## **SYSTEM 500**

**Circle No. 15 on Inquiry Card**



## Nevada FORTRAN for CP/M

— Designed specifically for microcomputers, Nevada Fortran is powerful, yet easy to use. It's both a subset and a superset of ANSI 1966 Fortran. Popular extensions include: If-Then-Else constructs, Trace style debugging, Copy statement, Arrays up to 7 dimensions and random access file support.

The high performance compiler generates 8080 machine language on all CP/M-based systems with at least 32K RAM. Dynamic object module loading and chaining takes place in seconds using the same fast loader as the Nevada COBOL compiler. *Ellis Computing, San Francisco, CA.*

**Circle No. 163 on Inquiry Card**

## Graphics Software Package: A

new computer software package that can increase productivity for educational institutions needing to generate line graphs, pie charts, bar graphs, and word charts has been unveiled. Called GRAFMASTER, the new interactive package eliminates the tedious and time-consuming key-stroking of statements required with many graphics systems and makes computer language command memorization a thing of the past. At the touch of a cursor key, users can quickly and easily navigate through fields on standardized panel sets — the windows into the picture's description — and either accept the defaults associated with the various fields or fine tune the picture by supplying different values. The package also eliminates the voluminous user manuals found with most systems and allows school personnel to teach themselves how the system works without ever looking away from the CRT screen.

GRAFMASTER can currently run with some 40 different output devices, including plotters, film recorders and publication-quality color slide systems from a variety of manufacturers. *Precision Visuals, Inc., Boulder, CO.*

**Circle No. 319 on Inquiry Card**

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### Basic Living Skills Programs:

Educators and parents may now select from nine program titles, all offering individualized instruction in basic living skills. Packages include a diskette, comprehensive instructional guide and worksheets. An optional back-up diskette is also available for each program. Programs from the Everyday Math Series include "The Problem Solving Process," "Solving Addition & Multiplication Problems," "Solving Subtraction & Division Problems," & "Solving Multiple Step Problems." From the Comparative Buying Series, programs include "Buying Wisely," "Becoming an Informed Shopper," "Understanding Sales Buying," and "Cash Versus Credit Buying." "Basic Math Skills Test," a program testing money-related math skills is available. MCE Inc., Kalamazoo, MI.

**Circle No. 317 on Inquiry Card**

### Non-Technical Computer Education:

Digital Equipment Corporation now has a series of video-based courses that examine computer technology and its use in business and industry. Designed for students, managers and other nonspecialists in both school and business environments, the courses provide a realistic, non-technical look at data processing concepts and applications. Focusing on topics such as office automation, the principles of programming and the role of computers in business, the series can serve as a core for a wide variety of academic and professional development courses. *The subject matter features case studies and interviews with experts. It is applicable to all computer systems and products.* Each course is comprised of one or more videotapes, supplemented with a reference book. The user can move through the materials at his own pace; and the courses are designed to be equally ap-

propriate for home, office or classroom environments.

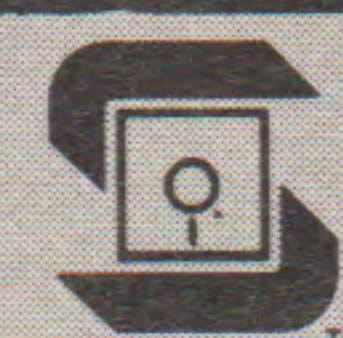
**Graphic Processing System** — A complete, self-contained professional graphics system available for Apple II Plus computers, produces professional quality, super-high resolution, multicolor transparencies and hardcopy graphics directly from the computer, without any special user knowledge or skills.

Comprising a Strobe 100 Graphics Plotter with a full 500 points per inch resolution and Graphics Processing System software developed by Stone-ware, Inc., the Strobe Graphics System has the capability to produce a comprehensive selection of bar charts, exploded pic charts, flow charts, curves, block diagrams, organizational charts, and even architectural renderings and isometric drawings using the Apple II Plus computer. Strobe, Mountain View, CA.

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## NEW PRODUCT ANNOUNCEMENT

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## Finally, a program that all teachers can use - Report Card!

You no longer have to be a computer wizard to be able to benefit from the computers that your school has been buying. The new REPORT CARD program from Sensible Software will enable you to easily track the progress of all of your students (up to 300 students per diskette) throughout the school year.

REPORT CARD easily calculates student and class averages. The various printing and sorting options in REPORT CARD can then be used to rank students within their class and post the results.

REPORT CARD keeps a permanent record of scores (including incompletes) from all lab exercises, quizzes and tests. Each of these

student activities can have any maximum score and can be individually weighted for their effect on the student's final grade.

A built-in, custom editor makes it easy to fix incorrect entries and to replace incomplete grades with actual test scores.

The manual includes a reference section and an easy to follow tutorial that will have you using REPORT CARD effectively in no time at all.

REPORT CARD is available for \$60 at finer computer stores worldwide, or you may order directly from Sensible Software. Please send \$1.25 per program for shipping and handling. Visa and Mastercard welcome.



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# Applications

## **PDP-11 Meeting School District Administrative Data Processing Challenges**

**E**lmhurst Community Unit School District 205 supports one high school, three junior high schools and ten elementary schools; educates over 7,500 students annually; and employs a staff of 720 in the city of Elmhurst, Illinois.

The complex administrative data processing needs associated with a school district this size prompted Elmhurst to become a pioneer member of a regional educational data processing cooperative. The cooperative offered online, interactive computing capabilities for financial reporting, student record keeping and guidance counseling. By 1978, the District and the Board of Education decided to investigate alternatives to cooperative computing.

In 1980 District 205 purchased a Digital Equipment Corporation PDP-11/70 computer with 512K-bytes of main memory, three RM03 disk drives, a TS11 tape drive and a 300 line per minute printer. In addition, they distributed 22 VT100 terminals and 6 LA120 printers in offices throughout the school district

- from the junior high school office, where terminals are used for recording demographic data on students and for producing state and local reports, to the district warehouse, where Elmhurst has developed their own inventory tracking program. Plans are currently underway to provide the elementary schools with terminals for academic computing.

The PDP-11/70 with the RSTS/E operating system offers Elmhurst a powerful computer system capable of meeting administrative needs and enabling academic computing to be introduced in the school district. The RSTS/E operating system provides interactive computing capabilities, a wealth of languages that support elementary to advanced users, and overall system security that guarantees data integrity among all computer users. In addition, the PDP-11/70's add-on capability enables the system to be expanded as needed.

The Elmhurst school district had found the hardware they required, but they still needed administrative software. After evaluating a number of administrative software packages, the selection committee decided on an integrated package of financial, payroll, personnel and student record software offered by Systems Eleven, a firm specializing in administrative software for school districts.

Data Processing Coordinator, Paul Rainey, attributes the efficient operation of Elmhurst's computer center to their PDP-11/70 computer and the Systems Eleven software. According

to Mr. Rainey, the computer virtually runs itself and the software is designed so that the responsibility for data entry and report generation is within the administrative offices. With each administrative office responsible for their own data, the workload in the computer center is significantly reduced.

The financial package is designed to meet financial accounting standards set by the U.S. Department of Health, Education and Welfare. The complete financial package includes a budgetary/accounting system, a payroll system and a personnel record system giving Elmhurst a complete financial management tool. System Eleven's student record keeping system includes packages for student scheduling, attendance, registration and grade reporting. The on-line, interactive scheduling package is designed to step the user chronologically through the entire scheduling process. It enables a student entering the school system to register, and to select and schedule classes right in the guidance office. With the RSTS/E operating system, the same file can be accessed simultaneously by users in different administrative offices with complete file protection.

Today, Elmhurst Community Unit School District 205 is effectively meeting the challenges of their busy school district with the aid of a Digital PDP-11/70 computer system and administrative software. The district now relies upon timely production of reports on its financial status. Payroll is produced for employees with varying work contracts and work schedules. Students are scheduled into a broad range of course offerings, in record time. Student attendance is effortlessly maintained despite complex tri-session scheduling. Grade reporting and student progress notifications are generated for normal marking periods and for special summer sessions. With their computing system, Elmhurst is equipped to handle a host of administrative functions with greater ease and efficiency.

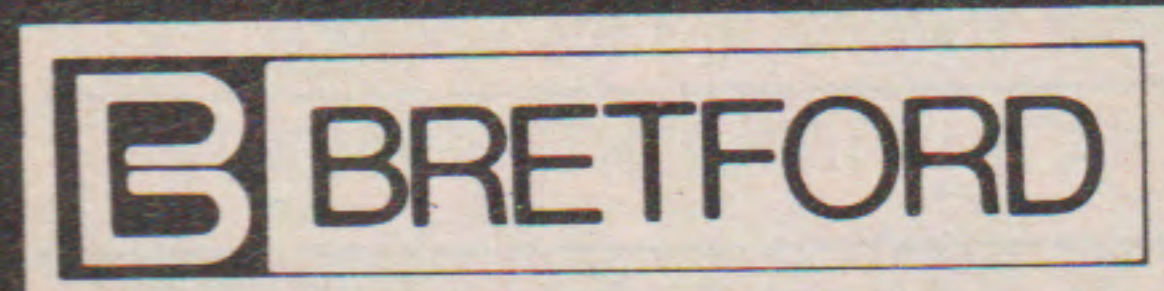
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## **New for Micro-Computers!**

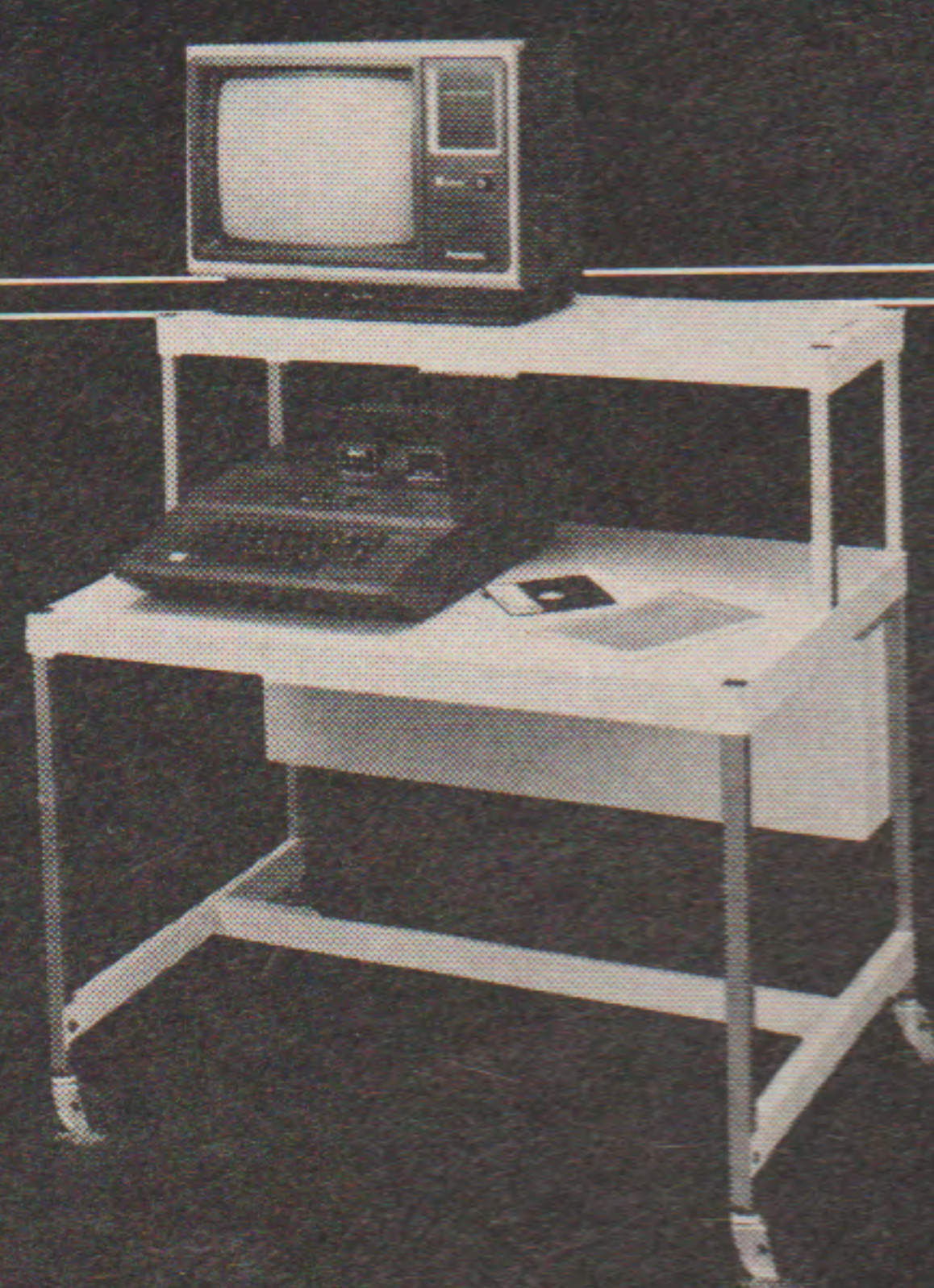
### **EC10 Educational CRT Table**

The EC10 Educational CRT Table offers you quality all-steel construction. An adjustable top shelf and work surface allow you to adjust the height for any application.

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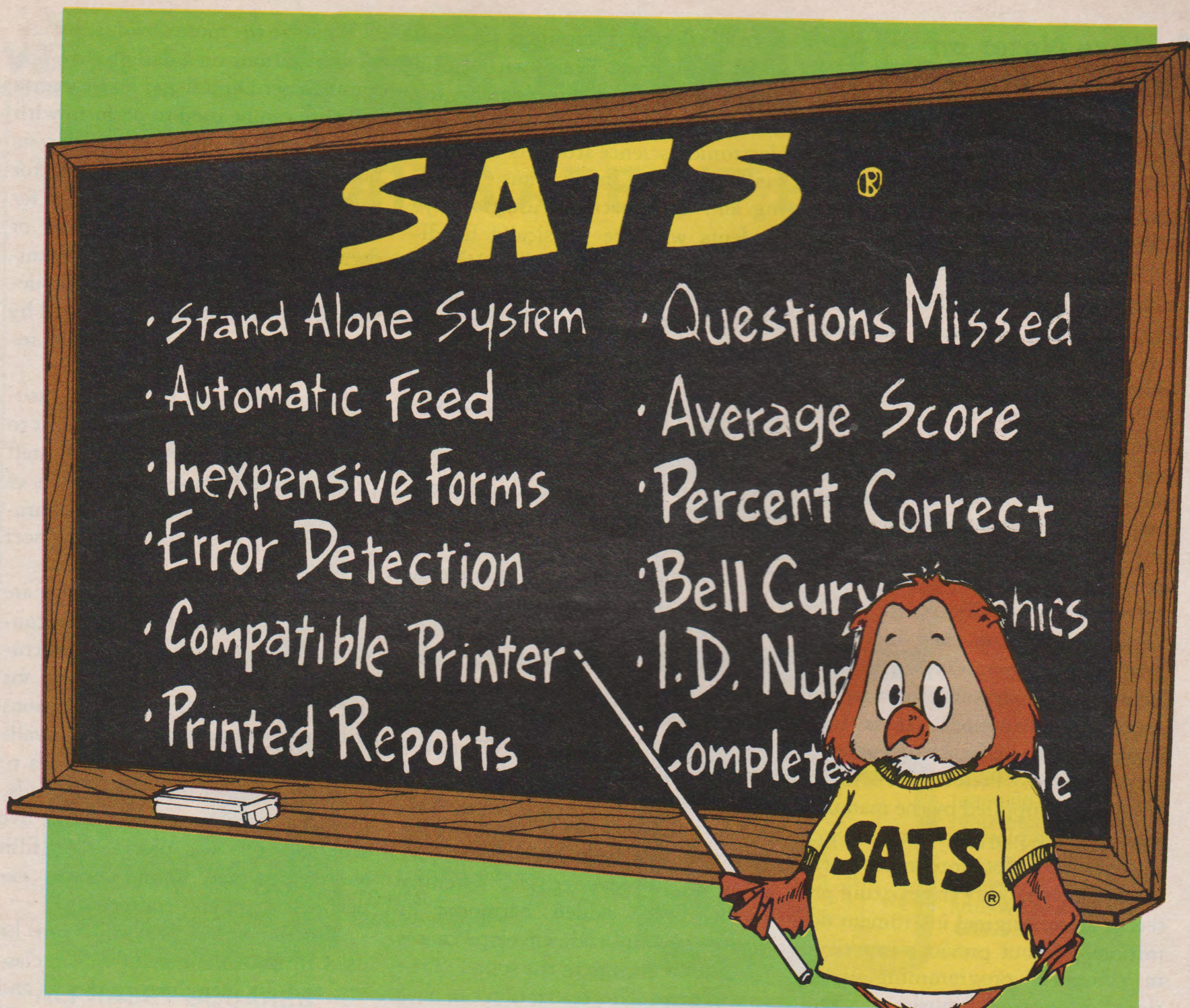


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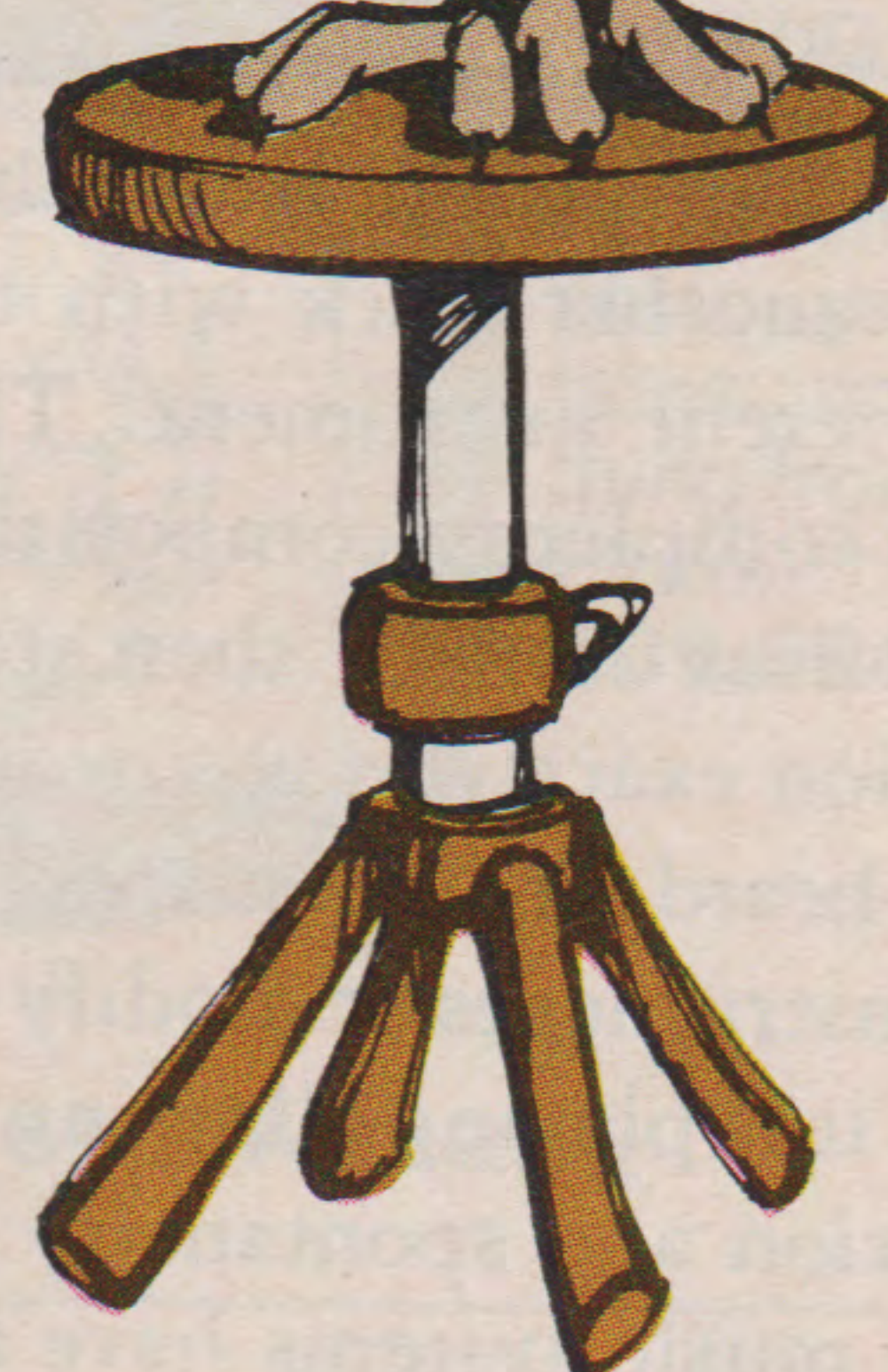


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## Stand Alone Test Scoring



Wheel your SATS system into the classroom, it's completely portable.

Pass out your answer cards and test booklets, and when the exam is completed, simply stack the cards in the automatic feed hopper along with the Master Answer Card and start the system.

Instantly, SATS begins to score them and within minutes your report is ready. It's that simple.

For further information on SATS contact:

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## Positive Notes on Computer Music

*From readers Cheryl Turrietta of University of Portland Performing and Fine Arts, and Anthony Turrietta of the Music Department at Portland Community College/Rock Creek comes the following.*

Computers are used successfully in many aspects of Music Education today, including self-paced ear training, sight singing, dictation, music transposition and printing, sound perception research, and creative composition. An affordable system that can provide an environment for the above with good quality stereophonic sound is the "Soundchaser Digital" manufactured by Passport Designs, Inc.

The system is designed for the Apple II Computer, and includes a forty nine key piano-type keyboard, the necessary hardware, software and operating instructions. It is built around the use of instrument definitions called "Presets." There are fifty presets supplied by the manufacturer ready to play, of which you may load ten at a time. More importantly, the user may modify the existing presets or create original instrument definitions without previous experience in computer programming, traditional or electronic music.

There is also a multi-track "recording sequencer" section; you can record on one track, play it back while recording on another track with the same or a different instrument. This allows you to complete a composition or performance as desired, then store the information exactly as you would like it to be heard. You can speed it up, change instruments or modify instruments as it is playing allowing for experimentation and spontaneity.

Computer music systems have applications for educational settings from elementary school training through graduate and professional studies.

What can learning computer music offer to teachers and students that contributes to conventional studies? The subject attracts students

from a variety of disciplinary interests and backgrounds. Those with music skills can learn computer literacy, introductory physics of sound and electronics; science students can learn fundamentals of music, music listening and appreciation. Additionally, students who are physically handicapped or less agile can be given an opportunity to perform and compose music, as well as study the elements of sound, with an instrument that does not require ten fingers or precise muscular coordination to get satisfying results.

Graphic displays of instrument waveforms and harmonic content combined with audio results contributes greatly to reinforcing concepts of the elements of sound. Understanding the separateness of and relationships between the elements of music improves analysis and synthesis skills. A student creates and solves a problem on an individual basis, thereby determining how the parameters might be set to carry out the task intended.

Learning to create original instruments as you hear each change can serve to improve critical listening skills. Every added harmonic or change in amplitude envelope causes a resultant change in the sound of the instrument. This realization can have a positive effect on awareness of musical nuance and subtleties in traditional music performance and composition.

When the concrete elements are presented with more clarity and can be manipulated by the user in an interactive situation, the larger, more abstract concepts of how voicing, orchestration, articulations, dynamics and tempo inter-relate to create the overall composition become more discernible and manageable. Achieving this expedites the compositional process at the mechanical level: assuming a more equitable balance of time and energy spent between the mechanical level of problem solving and a higher level of esthetic decision making will result in improved musicianship.

What are the more obvious, practical applications on a daily basis? The Soundchaser Digital and Performance Software can be used to perform with live ensembles, e.g., as an electric piano for Stage Band, a celeste for Concert Band, harp or harpsichord for Orchestra, and string ensembles or organ for choral and solo accompaniment. These instruments can be designed by students and performed by anyone who can play a keyboard instrument.

As a composing instrument, students who have not yet been taught to arrange music and score parts of staff paper can determine more aspects of their "song production," for example, by using the recording sequencer to layer parts.

Because up to ten instruments are ready to play at a time (unlike conventional synthesizers) the instrument can be used economically for live Theater and Dance productions with a wide variety of sounds available. (It takes only a few seconds to load other sets of instrument sounds, providing even more choices in a live setting.) It is also practical for film and video-tape sound track experimentation and composing.

The MusicTutor system can be used in fundamentals of music classes, and for introductory theory and ear training drills. The computer will play perfectly in tune, perfectly proportional rhythms and perfectly in tempo (unless you tell it not to). Using it for ear training may increase the possibilities of students doing the same.

The Notewriter software can be used for transcribing, transposing and copying parts. You can play them at the keyboard, display what you played and print it on paper.

The graphic displays of sound and the sound itself can be used in courses such as physics of music and introductory acoustics, and, of course, electronic music.

Computer-based music instruction is new, it's fun and I have yet to see anyone look bored using it.

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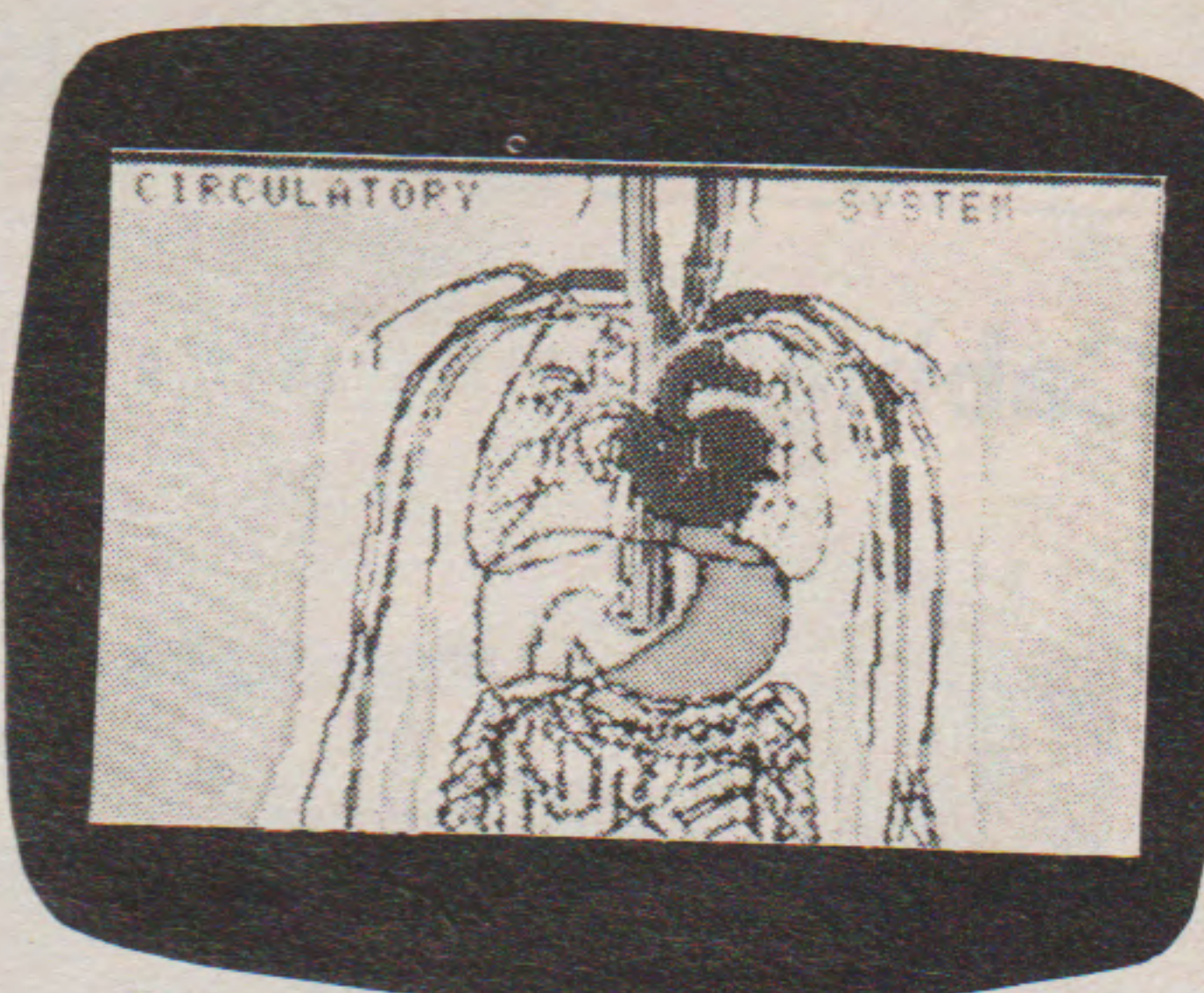
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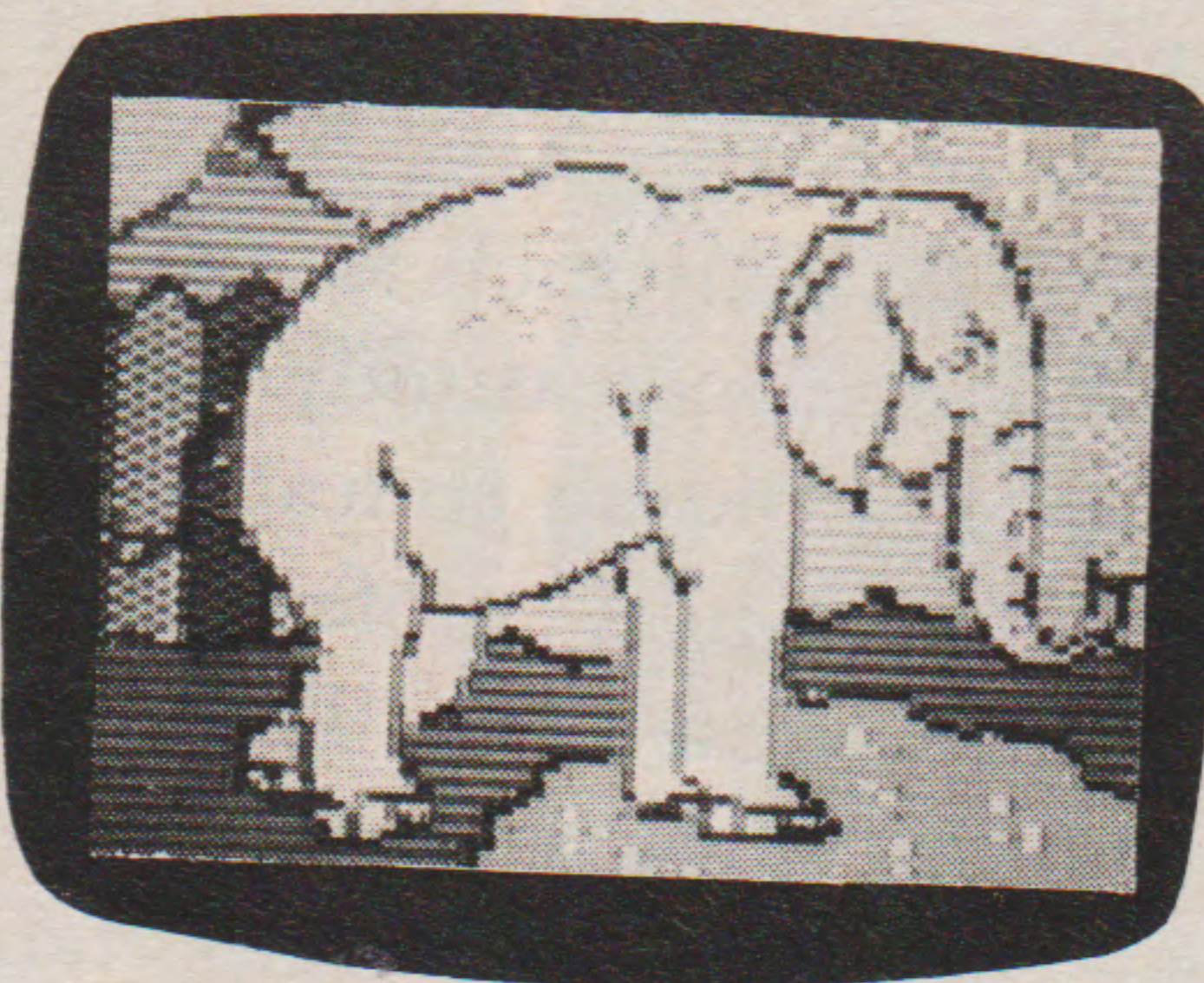
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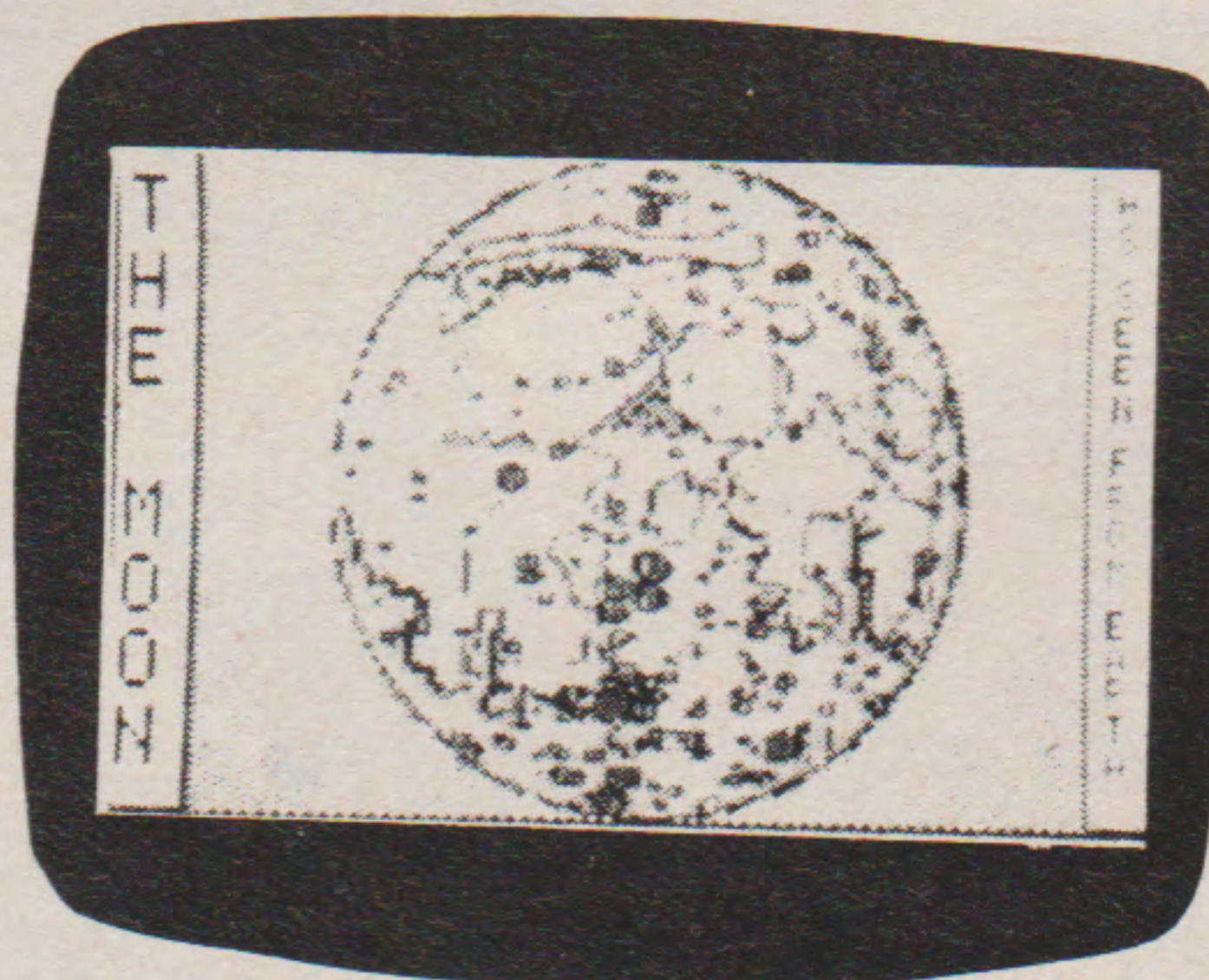
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## Emory Medical TV Network Offers Continuing Education to Medical Professionals

**S**ince 1967 the Emory Medical Television Network has provided medical institutions in the Atlanta area with information on and new developments in the medical field through its ITFS (Instructional Television Fixed Services) system.

James DeStefano of Electronics, Missiles & Communications, Inc. (EMCEE), a leading manufacturer of television broadcast equipment, explains that ITFS is a closed circuit, two-way TV system that allows an audience in diverse remote locations to view, via TV, lectures and intricate demonstrations. "Those watching the programs can engage in dialogue and discussion with the speaker, thus virtually replicating the classroom situation."

The Emory Medical TV unit (EMTN) was originally, in 1967, an arm of the Emory University School of Medicine, known as the Community Medical TV system, which occasionally broadcast black and white programs from a studio in Grady Memorial Hospital, Emory's main teaching facility, to six hospitals within the Atlanta area. The programming was initially funded by the National Medical Audio Visual Center and then by Regional Medical Programs, a federal grant. In addition, Community Medical TV system circulated video tapes of its programming among these hospitals.

In 1968 the name was changed to Georgia Regional Medical Television to reflect the growing circulation of the videotapes of the ITFS broadcasts throughout Georgia and bordering states.

In 1972, as circulation of the program spread across the nation, Georgia Regional became the Emory Med-

ical Television Network. In 1975, EMTN updated its studio at Grady Memorial and replaced its black and white cameras with color equipment in order to bring an added dimension of realism to its programming. In 1980, EMTN added a new 10-watt transmitter to its system in order to brighten and clarify its broadcasts.

Alan Kaminsky, administrative coordinator of EMTN explains, "We had used our first ITFS transmitter for more than 12 years. Since we had upgraded other areas of the system, we were looking for the most up-to-date, efficient replacement we could find."

Today, EMTN is self-supporting and broadcasts 3 hours of live, full-color programming Monday through Friday year round to 34 medical institutions in the Atlanta area. Regularly scheduled programs include Medical Ground Rounds, Pediatric Rounds, Cardiology Conference, Topics in Medicine and Gyn-Ob Rounds. In addition, specific areas in the medical field are spotlighted, like a one-month series on Acute Pediatric Care, which aired in July, 1982. Programs are repeated regularly in order to reach the widest possible audience.

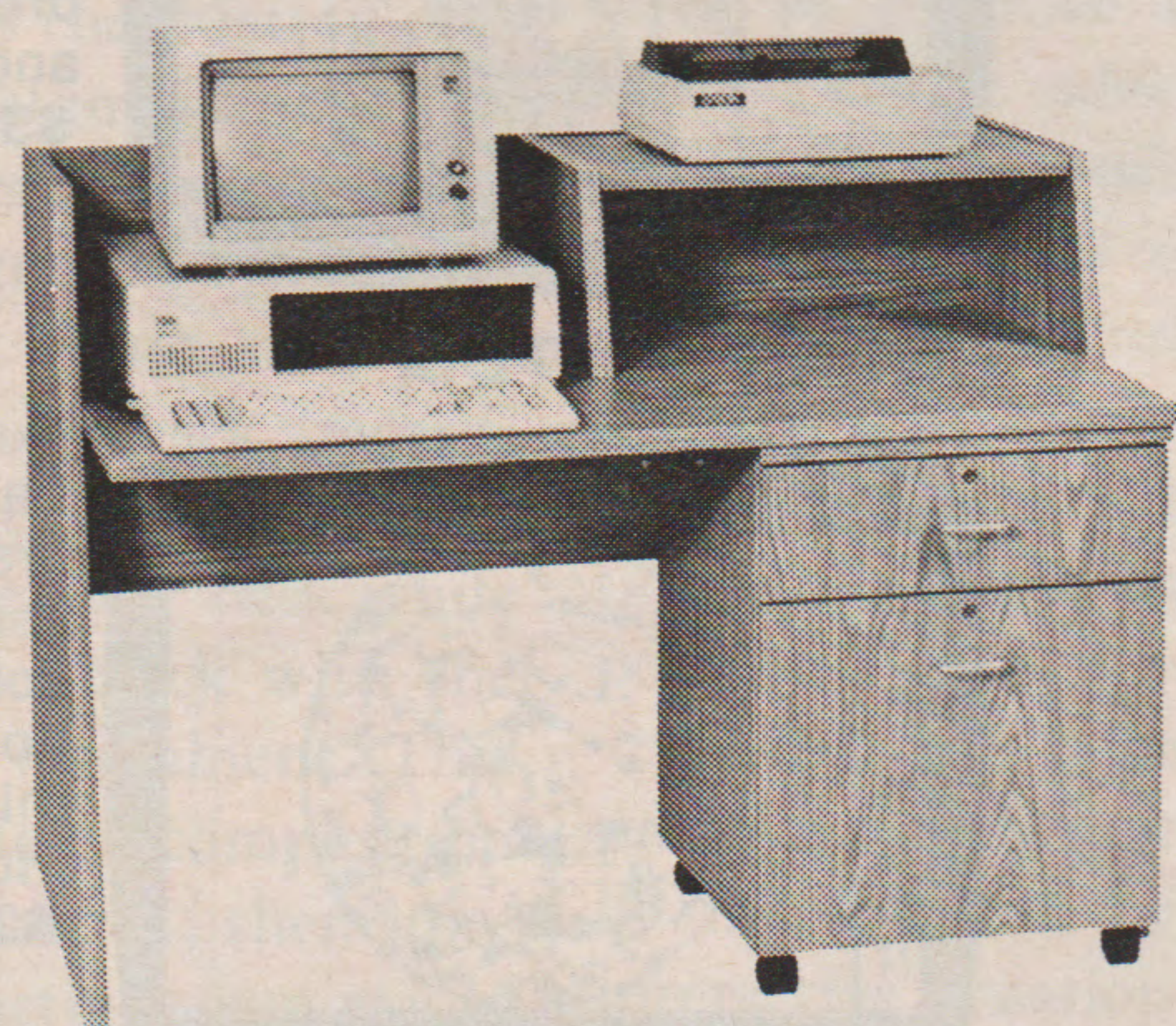
The videotape library now offers 400 different programs and has a circulation of 13,000, 10 percent of it outside of North America.

ITFS systems such as Emory's are playing an increasingly important role in continuing education for the nation's medical professionals. As DeStefano observes, "ITFS systems have been established as and will continue to be of great importance to education. In EMTN's case, the system allows physicians and other medical personnel to keep abreast of the latest developments in medicine without leaving their institutions."

Time and money are saved and needed education is imparted without undue interference in daily activities, thanks to this specialized TV programming."

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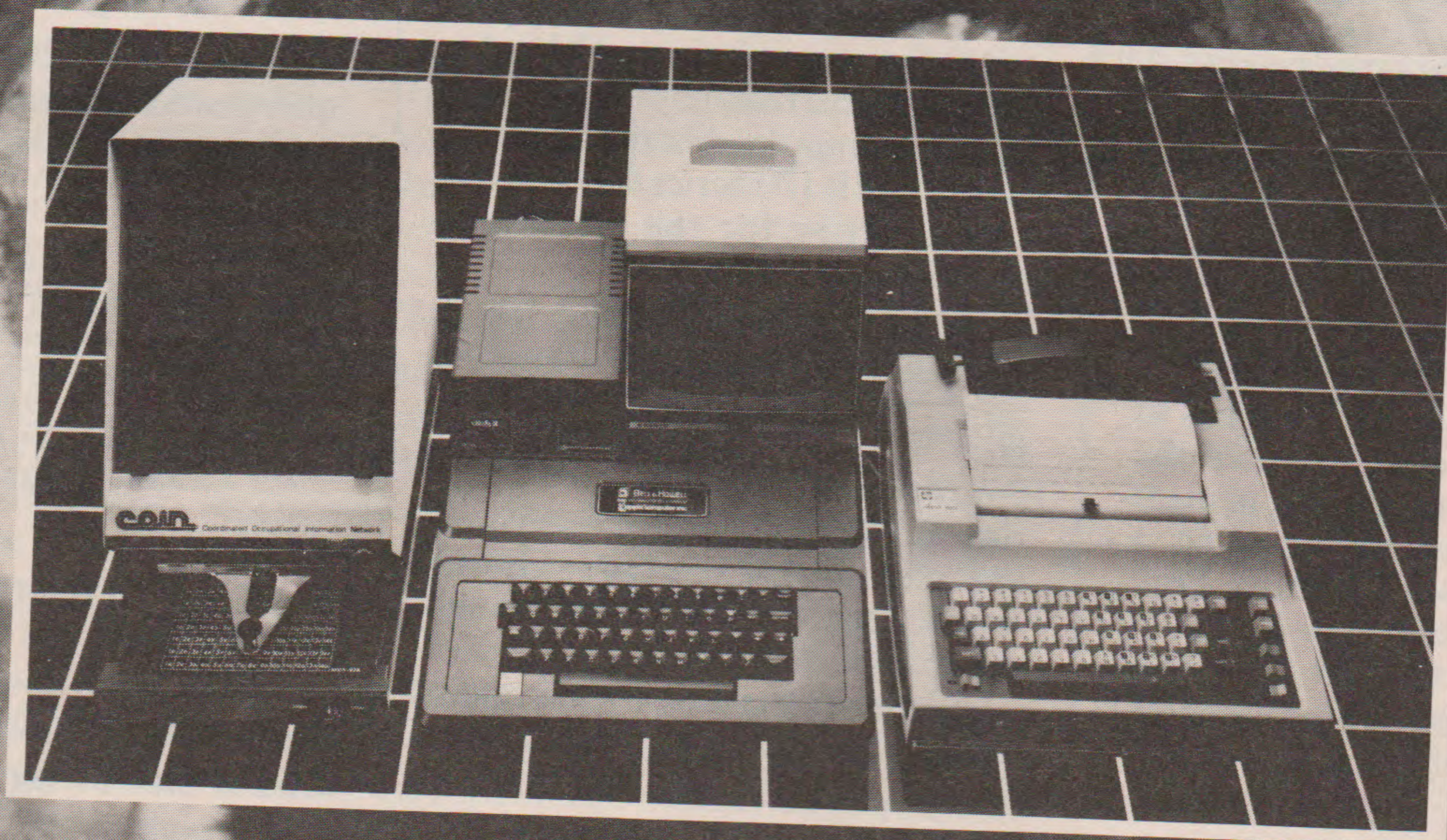
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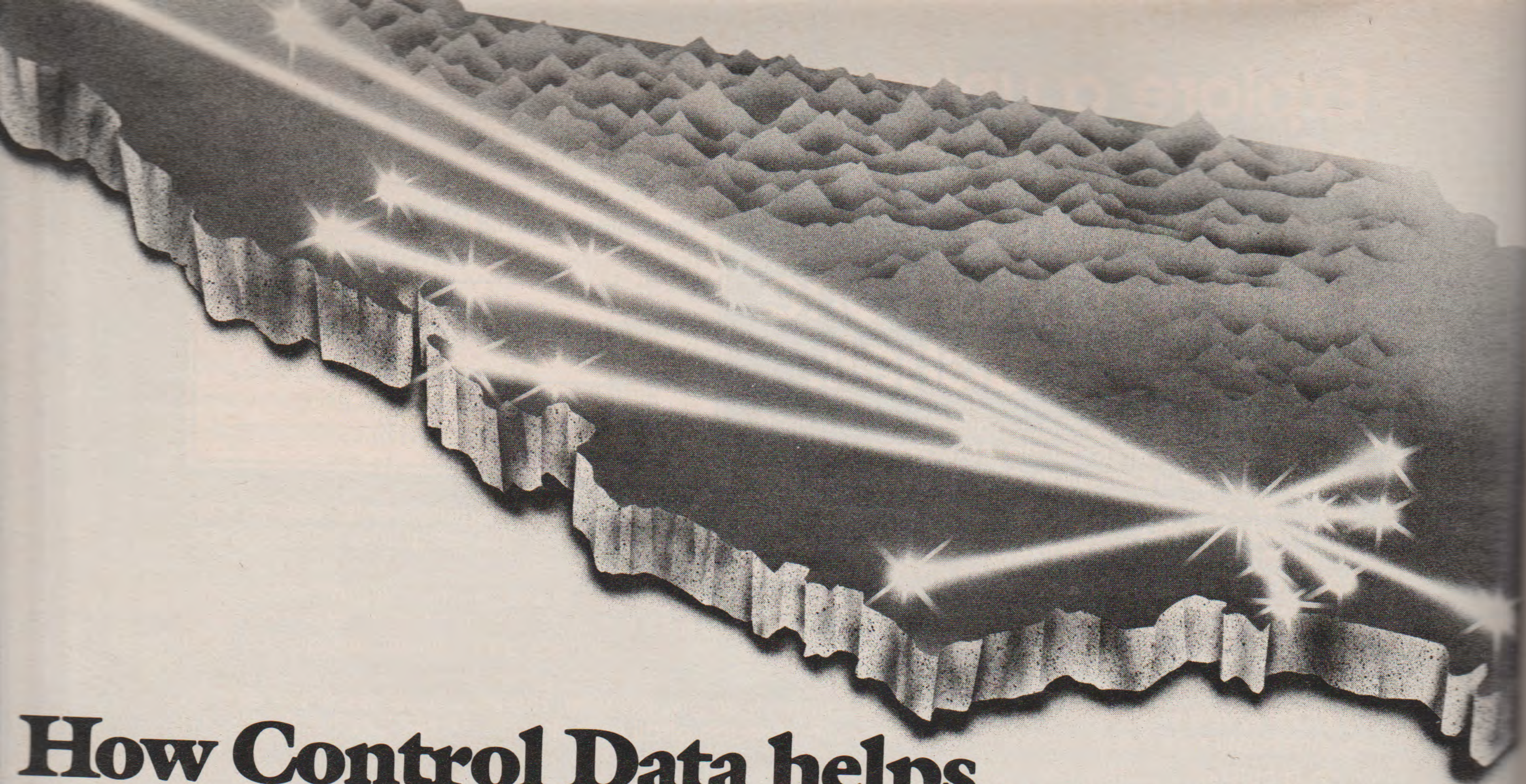
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## CONTROL DATA

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# Computers in Swedish Schools: Experience, Research and Problems

BY ANITA KOLLERBAUR

## Introduction

Research and development in Sweden relating to computers in schools have been divided into three main sections.

1. Instruction concerning computers and their use in society.
2. The use of computers in schools to modernize teaching content in various subjects.
3. The use of computers as an aid to learning.

The computer can be applied to a wide variety of purposes in the school sector. It can be used for such administrative tasks as timetabling, facility distribution etc. or to support teaching in various ways. It can also be used for general instruction concerning computers and their utilization in the community.

Research, development and the introduction of computers in schools in Sweden are considered under three headings.

1. Instruction concerning computers and their utilization in the community, in short, computer appreciation.
2. The use of computers in schools as a means of modernizing teaching subjects, e.g. the computer as a calculating aid. In short, subject-related computer utilization.
3. The use of computers as an aid to learning. In short, computer-assisted learning (CAL).

The first of these headings implies general instruction for all pupils at the senior level of compulsory school (grade 9 at present) and in all lines of grade 1 of upper secondary school. The rule is that computers are to be used as calculation aids and as a means of illustrating computer utilization in various upper secondary school disciplines. R & D work relating to these two fields was undertaken between 1974 and 1979 in the DIS project (DIS being the Swedish abbreviation of "Computers in schools"). The results of that project are now being applied to everyday school activities.

Within the CAL sector, research is still continuing under the PRINCESS project (Project for Research on Interactive Computer-based Education Systems), which will be concluded this year.

## Initial Programs

Analyses of similar instruction in Sweden and abroad revealed that no international experience was directly applicable to Swedish schools. Knowledge concerning the way in which instruction should be designed and deployed has been gained primarily through practical experimentation. Teachers and EDP specialists have, for example, formulated and revised ideas concerning syllabi, the construction of experimental teaching materials in several iterations interspersed with experimental activities.

Experiments have been conducted, at both levels, in schools having access to computer equipment of various makes and in schools having no such equipment at all. Syllabi, teaching materials, teaching methods and teacher training have all been studies in the course of the experiments, which have involved a total of some 450 teachers and 8,000 pupils, divided between computer appreciation (300 teachers and 5,000 pupils approx.) and subject related computer utilization (about 150 teachers and 3,000 pupils). No systematic investigation has been made of the spill-over of the experiments, but as every

**Knowledge of how instruction should be designed has been gained primarily through practical experimentation.**

*Anita Kollerbaur is Laboratory Leader in the Department of Information Processing and Computer Science at the University of Stockholm in Sweden.*



**Sweden has decided to integrate general instruction about computers with various teaching subjects.**

teacher teaches several classes in the concerned subjects, the number of involved students are much higher.

The experiments were evaluated by means of questionnaires distributed to pupils and teachers, through discussions at conferences of teachers and pupils, and in field trips to various schools. This evaluation was above all aimed at identifying the advantages and drawbacks of computer appreciation.

All municipalities and county councils had been invited to take part in these experiments, and the level of interest had been such that participants had to be selected. Selection criteria varied according to the particular problems to be studied, but one aim was to distribute the experiments geographically and, within the municipalities taking part, to conduct them in both compulsory and upper secondary schools.

The teachers taking part in the experimental activities were given a week's training during the summer holidays. The group as a whole was presumably rather more favourably disposed than the average teacher would be towards teaching and about computers.

The computer appreciation syllabi were revised no less than three times. The first syllabus was tried out in 1974/75, the second and third in 1975/76 and 1976/77 respectively. The experience accruing from these experiments formed the basis of a concluding round of experimentation in 1977/78, on which standpoints concerning the way in which Swedish schools are to be provided with general instructions about computers and their use were thus based.

During the experiments, the teachers devoted between 20 and 40 lessons to computer appreciation.

### **Instruction Concerning Computers And Their Use In Society**

Sweden has decided to integrate general instruction about computers and their use with various teaching subjects, instead of introducing a new teaching subject. There were two main reasons for this.

1. It is unrealistic to create new subjects parallel to changes in the community at large. The tendency in Swedish schools is more in favour of projects or thematic studies.
2. Instead of equipping pupils with specialized knowledge, the intention was to present the computer as an aid for various purposes.

Computer appreciation could have been integrated with a vast number of subjects, from Swedish to mathematics, but for practical reasons this integration has been confined mostly to mathematics and civics. These subjects are taken by all compulsory school pupils, and they are also included in most lines of upper secondary school.

The purpose of computer appreciation has never been debated. The aim throughout has been to convey knowledge which will make it easier for pupils to appraise and influence the use of computers in society.

Opinions were divided concerning the detailed teaching content required in order to confer this knowledge. The slant which the project team wanted to give to computer appreciation differed from the approach adopted in other European countries and the United States, in that it was far more societally oriented. But many Swedish specialists at the time would also have preferred a more technical emphasis than was proposed.

The experiments showed that instruction could be introduced at the senior level of compulsory school, and computer appreciation is now a compulsory feature of the mathematics and social subjects syllabi. It is also mentioned in the natural science syllabus.

Compulsory school pupils are introduced to the various fields of computer processing which exist today and may conceivably come into being in the community at large. This introduction serves to make them aware of the



consequences of computerization in relation to the individual and society. This instruction also conveys an idea of computerized data processing and of the potentialities and limitations of different ways of designing data systems. It also includes a general presentation of legislation and governing the use of computers.

Programming has not been made a compulsory teaching subject in compulsory school, partly for financial reasons, but also for reasons connected with the subject itself. This is a somewhat controversial matter, and there is a debate in progress concerning the value of BASIC programming in relation to the goals laid down for this instruction. Some protagonists argue that programming needs to be taught so as to bring the whole subject down to earth and facilitate a proper understanding of the various sections of computer appreciation, while others maintain that no such knowledge is needed.

Some portions of the general instruction were too difficult for pupils at the senior level of compulsory school. This was particularly true of sections concerning structural change in society, international perspectives, advanced studies of detailed points, implications for the individual, problems relating to privacy and secrecy, etc. These sections have therefore been transferred to upper secondary school.

The instruction given in upper secondary school is designed to give the student an appreciation of the way in which computerization affects the social structure and also of the apportionment of responsibilities. Special emphasis has to be laid on the use of the information network and on the role and opportunities of the individual in connection with the introduction and use of computer systems at various workplaces. Students in the three and four-year theoretical lines of upper secondary school must be able to use computers for problem solving by writing programmes of their own in a high level language.

The experiments conducted in vocational lines of upper secondary school have shown that instruction should be given more of a practical slant, so as to provide the students with the knowledge they need concerning the impact of data processing on a particular occupation or field, and so as to prepare them for activities within that field.

Both teachers and pupils feel that computer appreciation should be jointly based on mathematics and civics. Computer appreciation has proved feasible within these subjects without any detrimental effect on the subjects themselves. In upper secondary school mathematics, students have actually been found to acquire a more positive attitude towards the subject, and by using the computer in problem solving they have developed their capacity for formalizing and solving problems.

Both teacher and pupils have been asked concerning their attitudes towards computer appreciation and the use of computers in society. After receiving this instruction, 73 per cent of the pupils find computer appreciation fairly or very interesting, while the remainder are indifferent and find the subject fairly or very tedious. 82 per cent of the pupils agree, wholly or partially, that our society needs computers, while the remainder are indifferent or disagree to a greater or lesser extent. All teachers feel that computer appreciation should be put on the school timetable and that the proposed syllabus is a good one. The conditions for introducing computer appreciation were consequently advantageous.

The effects of the experiments were favourable. The instruction has increased the pupils' knowledge of facts concerning computerization, and it has improved their ability to adopt standpoints to statements concerning the use of computers in society and to follow the current debate. The experiments have also shown this instruction to provide natural opportunities for project and problem-oriented teaching. The pupils for their part find the instruction pre-eminently realistic, due of course to such activities as field trips to workplaces where computers are used. Computer appreciation also provides

**Programming has not been made a compulsory subject, but there is a debate concerning the value.**



**Students greatly appreciate using software coming from real life, but teachers find it hard to integrate in instruction.**

opportunities of varying working methods from individual studies to group work.

### **Computers As A Means Of Modernizing Teaching Subjects**

The project also had the task of investigating potential uses of the computer in schools as an aid to calculation and methods at upper secondary level, above all in the illustration of computerization by means of practical examples. Development work was confined to mathematics, physics, business economics and various group of technical subjects. These activities presupposed that the upper secondary school students had been taught computer appreciation before starting to use computers in various subjects.

Two main approaches are involved where commercial subjects are concerned. One of these is to develop special computer programmes for school teaching, i.e. programmes which often provide a miniature depiction of the activities concerned. The other entails using programmes from companies and organizations which are only slightly modified to suit the teaching situation, e.g. by means of specially formulated instructions and simplified communication with the programme.

The students greatly appreciated using software coming straight from real life, while some of the teachers found it difficult to integrate these programmes with their own teaching. Existing teaching episodes have to be extensively replanned, and the teacher himself has to be highly proficient in the use of the programme.

In mathematics, numerical methods have been integrated with teaching by means of computer support. These experiments showed:

- Pupils can work experimentally in order to discover mathematical relationships.
- Subject matter can be given greater concretion.
- The pupils acquire a more solid foundation for the analytical aspects of mathematics.
- Greater co-ordination can be achieved between physics and mathematics.
- Numerical methods can be used in other subjects, especially technical ones.

### **In-Service Training**

One week's training was provided in connection with the experiment. Teachers were then expected to be able to provide instruction as per the syllabus on the strength of independent studies and planning collaboration with their colleagues, as regards both computer appreciation and the subject-related use of computers. This of course, was far too short, and in the summer of 1982, the participating compulsory school teachers were given three weeks' training and their upper secondary school counterparts at least five weeks' training.

Various models have been discussed, but for quality reasons the choice has been that the teachers will be trained by special subject and methods experts. The method at present being used is for the teachers to take place in a course at a college or in distance teaching conducted by a college. The goal is that approximately 30,000 teachers shall be trained up to 1986. This will probably not be fulfilled due to lack of resources of different kinds.

### **Teaching Materials**

Computer appreciation and computer utilization demand new teaching materials in schools, viz computer programmes (software) and computer equipment (hardware). This in turn raises a number of questions. What software and hardware are needed for teaching? How are these acquisitions to be financed? And so on.

The simplest solution to the school computer problem is to develop a



national computer which all schools have to install. This eliminates the problems of purchasing, of software immobility, of close and compelling links between a particular computer make and printed teaching materials, etc.

But is this the best solution? This question need not be decided in Sweden for the time being, as computer equipment is purchased at local (municipal) level. In addition, the general opinion among those responsible for such matters in schools is that the individual school and municipality must be free to choose their teaching materials and that this is an advantage from the instructional viewpoint. But of course, a national school computer can compete in the procurement process, which should result in the choice of the best computer at the lowest price.

A technology procurement project has been started in Sweden with the aim of giving Swedish enterprise and industry a better chance of competing in the school computer market, and this may result in a Swedish school computer. Swedish firms have been invited to tender a (new?) product on the basis of a detailed specification of demands drawn up jointly by representatives of schools, research and industry.

Examples of the functional stipulations made concerning computer equipment are that each individual workpoint must be capable of development for future applications and the base system function, must contain graphics white with a resolution of about 500 x 500 dots. In addition, each work point must have facilities for communicating with another, larger computer, either for running programmes on the latter or for shifting data programmes between the systems. The stipulations also include detailed specifications concerning software and types of documentation. Ergonomic aspects of computer equipment and software have been taken into account. Procurement will begin during the autumn of 1982.

Thus Sweden still has the problem of different schools/municipalities having to do their own purchasing of computers and software. This requires support. A large number of different schools precludes centrally formulated standard specifications. To assist schools in the business of procurement, a detailed report has been compiled by the PRODIS project (Software and computer equipment in schools) at the National Board of Education. This report deals with requirements concerning computer equipment for different subjects, general stipulations to be made concerning computers and software and schools, operating problems, how to draw up a specification of requirements etc. In addition, staff receive central guidance from the NBE (through the DUN project — DUN being short for "The computer in teaching") and from the Swedish Association of Local Authorities.

But even if "good" purchasing is within the bounds of possibility, there are still problems. Often no specification is made of requirements. Instead an approach is simply made to a supplier who is said to have suitable equipment (purchased, perhaps, by a school in the neighboring municipality). Representatives of different subjects differ in their awareness and influence when a school is about to purchase a computer. If the mathematics teacher dominates his school, this can result in the purchase of equipment which makes poor provision for the requirements of economics subjects.

Another problem concerns the difficulties involved in forecasting needs both quantitatively, i.e. in terms of the number of computer work points, and qualitatively, i.e. in terms of the way in which the computer will be used. In 1979, for example, five work points per school was considered a minimum requirement. This had already risen to 10, preferably 15 work points per school by 1981. (Needless to say, the number of work points had to be adjusted to the size of the school concerned.)

In addition, greater demands are being made concerning facilities for the use of advanced software. For example, teachers illustrating data processing in

**The simplest solution to the school computer problem is to develop a national computer which all schools use.**



**Vocational instruction  
should provide students  
with knowledge  
concerning the impact  
of data processing on a  
particular occupation.**

the community at large want to be able to show data base handling, and this makes special demands on the equipment.

BASIC is at present practically the sole language used for pupil programming and for developing applied programmes for schools. It is agreed, however, that this is not a very happy state of affairs. BASIC has many advantages. It is easy to learn and can be used with practically any kind of computer. On the other hand, it is a non-structured language and therefore does not directly support a natural way of solving problems.

No systematic efforts have yet been made to use other languages besides BASIC. As part of the research activities of the CLEA (Computer-based Learning Environments) centre, work has begun on the analysis of different languages with reference to the requirements for a school language.

Another problem connected with software and hardware is that of who is to develop and distribute applied programmes for schools. At present this is done almost exclusively by producers of teaching materials. A certain amount of development is being financed by the State, and these programmes are of course universally free available. Various methods of encouraging teachers to develop their own programmes have been tried in Sweden, and attempts have also been made to devise ways of distributing information about these various programmes. But it has not been possible for example, to create a common data base for programmes developed by teachers who have been unwilling, for various reasons, to part with their software.

### **Integration Of The Educational And Administrative Use Of Computers**

The integration of the administrative and educational use of computers in schools has been a much discussed topic in Sweden. When research and development began in 1973, the widely accepted view was that financial considerations would lead to the integration of the educational and administrative use of computers in schools. This, it was argued, was the only possible way of putting computing resources at the disposal of schools, and the rationalization benefits thus obtained in the administrative context would finance the use of computers for teaching purposes. A careful inquiry was undertaken with a view to this type of integrated solution, and it had been proposed that a model experiment should be mounted in one municipality. Thus it was hoped that the actual procurement of computer hardware for schools would not require any new resources. The project, however, took a critical view of this solution and began by drawing up one calculation for a purely educational solution, one for a purely administrative one and a third for an integrated solution. These calculations were founded on the use of a minicomputer system in various configurations. They showed that there would be negligible differences in the costs respectively entailed by the three types of solution. The project therefore proceeded to study the educational use of computers in schools without considering the possibility of their administrative use. Existing forecasts indicated also at that time that the cost of hardware would eventually become a less burdensome item in connection with the use of computers.

The same debate is now in progress at municipal level. School policy makers and school administrators often stipulate that the computer must be used in school administration, making this a condition for funding the procurement of equipment for classroom use. Some schools, however, have adjusted to this stipulation and integrated their administration with the educational use of computers. Some schools have common access to the computer, i.e. the computer is used simultaneously for administration and teaching but there are separate terminal work points available. Other schools have reserved certain days for administrative data processing. In schools which have purchased micro computers, the administrative side has a microcomputer of its own. The latter



case does not present any integration problems. The other two, understandably, have proved to be a mixed blessing. No systematic analyses have been made of experience hitherto, but the occasional instance has been reported of pupils managing to penetrate security systems in the software and destroying administrative data and programmes, which has naturally been a cause of worry.

Thus it remains to make school policy makers at municipal level that integration of administrative and educational use of computers has to be carefully analyzed from different point of views.

### **Continuity**

So far we have been mainly concerned with problems surrounding the introduction of computer appreciation and utilization in schools. The question of how to keep activities going is no less important.

There is, for example, the question of how to update teaching. Methods will have to be devised for continuously revising teaching content. This involves problems relating to both teaching materials and training problems which are now discussed but have not yet been solved.

Another question concerns ways of keeping teachers motivated to provide the instruction desired. The Swedish experience is that teachers do not continue this instruction to the same extent as during the experimental phase. The new model, whereby training is to be organized in conjunction with local development work at the individual school, may perhaps solve the problem of ensuring that teachers continue to teach computer appreciation and use computers in different subjects. The fact that the syllabi are now compulsory may also make a difference, but the need for some kind of continuous stimulus for teachers is not to be underestimated.

Finally it should be observed that, in order for those portions of teaching requiring the use of computers to function smoothly in schools, there must be an organization which is responsible for the computer system, its operation and development and for providing teachers and pupils with some kind of back-up in their practical use of computer equipment. There is more to it than just installing a computer.

### **The Use Of The Computers As An Aid To Learning**

The experience gained by Swedish schools of CAL has mostly been geared to research within the PRINCESS project (Project for Research on Interactive Computer-based Education Systems). Since this project has not yet been completed, only the approach adopted to CAL will be presented, together with research methods and experience of the same.

PRINCESS is concerned to see whether, and if so how, education can be improved by the use of computer aids. A model of a system for computer-based education is being developed and continuously evaluated.

The pedagogical approach in PRINCESS can be summarized as follows:

- Knowledge is derived from the experience gained while performing activities.
- The student must be able to control the activity.

PRINCESS has focused its research on general computer aids for storage/retrieval, processing and communication of data and computer aids for interactive work with subject models of different types.

The PRINCESS approach to computer-based learning entails particular requirements concerning such courses. An interactive programme used in a course of this kind should:

- Make operations on non-trivial models available, e.g. work with analytical models, information retrieval and simulation.



**Sweden has developed a national policy concerning computers in schools.**

- Be easy to use.
- Be easy to modify and develop, from a subject viewpoint as well as in terms of pedagogical approach and in concrete interactions.
- Be executable on different types of input and output media.

The research is interdisciplinary, and the approach can be characterized in terms of systems thinking, the conception that pedagogical requirements must influence the technique, and the principle that the people involved must participate in systems development. Furthermore, the development of methods and tools must be interleaved with empirical studies.

The research approach (which is necessary for this type of research) has caused some problems, such as the following:

- Empirical work is time consuming.
- The interdisciplinary approach causes co-ordination problems.
- Part of the work is means-oriented rather than goal-oriented, i.e. concerned with developing some of the software for the applications.
- Co-operation with users and financiers leaves less time for primary research. Sometimes concrete products had to be presented while basic research was still lacking.
- The academic environment and the application field make different demands on research activities. For instance, reports in Swedish must be the principal means of disseminating results.
- Demand for modern technology combined with a limited budget for equipment has forced the project to purchase badly supported research products.
- It is difficult to exchange equipment within the scheduled duration of a project.

### **Conclusions**

Sweden has developed a national policy concerning computers in schools. This policy has been discussed and determined by the Riksdag (i.e. the Swedish parliament) and enjoys strong political support.

But people not attending school also need to learn about computers and their use. In working life, a great deal of instruction in computer appreciation has been organized under the auspices of both employers and unions.

A wide-ranging information drive concerning data questions has been addressed to the general public and has included debate publications, exhibitions, theatrical performances, etc. Procedures are being framed to increase the support given to data courses arranged by adult education associations.

The National Swedish Data Policy Commission is paying close attention to education in this broader sense. The Commission is a broad-based committee whose task is to assist the Government and Riksdag in data questions. One aim there is to evolve a Swedish data policy.



# Instruction of Numerical Control by Computerized Simulation System

BY NAFTALI GOLDENBERG & MIRI MISHKOVSKY

## Introduction

Comprehensive technical education strives to produce qualified personnel capable of acclimating themselves to growing and developing industry. As a result of industry's move toward highly intelligent automated controllers and machines, the present day operator is more and more involved in decision making. It is the responsibility of the educator to give the student a thorough understanding of programming, analysis and control; in short, the intellectual tools for thought processes involved in complex problem solving. Success of any computerized machine depends on the acceptance and understanding by the user of the machine's capabilities and limitations in relation to himself. Our current system at Boys Town Jerusalem has a broad range of components which allow the realization of the educational goals discussed.

With the coming of the industrial age, Israel generated a need to sponsor a highly technical, comprehensive vocational discipline in its educational process. Boys Town Jerusalem, a Yeshiva High School and Junior College for 1200 students, is the cream of Israel's comprehensive educational system. The Computerized Numerical Control system to be reviewed in this article was a joint effort by the Alexander P. Hirsch School of Applied Mechanics, Department of Numerical Control, and the Isaac L. Auerbach School of Computer Science Systems Group here at our campus.

Included in the curriculum of the vocational education process is the students exposure to advanced topics in technology, i.e., computers, numerical control, industrial automation, etc. Our responsibility to teach NC to our students stems from the total acceptance and integration of the NC machine into the world of industry.

The structural concept behind this system is an integration of three distinct subjects and teaching aids into one highly sophisticated instructional course.

1. Numerical Control — Theory and Workshop
2. Computer Programming — Theory and Practice
3. Visual Aids — Video Tape Recorder

## Numerical Control — Theory and Workshop

Numerical control is a control system for machine tools and some industrial processes in which numerical values corresponding to desired positions of tools or controllers are recorded on punched paper tape, punched cards, or mag-tapes, so that they can be used to control the operation automatically. The system at Boys Town Jerusalem consists of two different numerical control machines connected to two different milling machines. The machines have two distinct but similar programming languages, one of which conforms to EIA Standards while the other machine is used ten to one by the Israel industrial market. Tentatively we decided to teach the Sharnoa language to our students because of its prevalence in Israeli industry. A post-processing routine is used to translate both languages to common TTY code, thereby benefiting from the advantages of the two languages.

Fundamentals of manual operations of the milling, drilling and lathe tool producing machines is given to the students in the workshop as a prerequisite course to the CNC (Computerized Numerical Control) program. The CNC course lasts 90 class hours over a period of one and a half years.

Syllabus:

1. Theory of NC

**Numerical control systems for machine tools allow position of machines to be controlled automatically.**

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2. Generations of NC from NC, CNC to DNC
3. Modular structure of the two systems available at Boys Town Jerusalem:
  - a. Sharnoa Electronics CNC 745
  - b. Yizreel Electronics CNC 450
4. Description of fully automated CNC system available on the market
5. Analysis and design of parts processing
6. Principles of parts programming logic
7. Sharnoa's programming language
8. Execution of students programs on NC machine

At Boys Town Jerusalem the two CNC machines have single user capabilities. Access by the students to these machines was limited to one student per each machine at any given time. The maximum practical experience by the students was two exercises per semester. It appeared that the small amount of lab hours available was minimizing the possible achievement of the course. The expense of each trial run was a restricting factor in the use of the machines. There was also the risk of unintentional damage to the machines by the students in practice runs.

### **Computer Programming — Theory and Practice**

The academic discipline of teaching Computer and Information Science on the secondary school and junior college level has been available at our school for the past five years. Computer literacy and elementary BASIC programming are required courses for all those students attending BTJ. In addition, students in the electronics and mechanics department are required to take a course called "Computers in Industry" and courses from the computer science syllabus pertaining to their chosen major. Once having been exposed to the computer and its potential, the students are encouraged to utilize the computer as a tool for other courses outside of the computer science department. The department's staff remains available to assist and advise students who show an interest in the use of the computer.

The Computer Center at Boys Town Jerusalem houses a PDP 11/45 operating under a RSTS/E V7 system. A classroom of 16 terminals is served by this DEC Time Sharing System. The software which allows the interface of the two CNC machines to the PDP time sharing was developed and designed by our systems group during the course of one and a half years. The underlying concept of this system was to have the students as a class use the computer as an intermediary between themselves and the NC machines, thereby increasing the availability of the machines eightfold. Of course, once the decision was made to tie the NC machines to the computer, it was decided to dedicate more time and manpower to build a totally Computerized Numerical Control Educational System. This would revolutionize the actual learning of NC by our students.

The terminal classroom is now used in parallel with the workshop. Students get all the programming practice they need. The computer allows all the students in the classroom environment to create, edit and run their individual programs at their own pace. Errors are detected interactively before the program executes the actual milling process. When the program is debugged by the system, a papertape which may be fed through the CNC machine for milling of a tool is punched.

The workshop contains the two CNC machines previously mentioned and two teletypes which are connected to the control units and to the main computer.



## Visual Aids — VTR

Among the visual aid tools used in the classroom, there is a video tape recorder on which the instructor has filmed a number of programs in execution. The TV screen of the VTR also acts as a giant CRT with a key board built by our electronics department. The instructor then keys in a program, runs it through the system and simultaneously shows the physical execution of the program.

The teletypes in the workshop operate in two modes:

1. indirect mode — teletype  $\frac{1}{2}$  computer
2. direct mode — teletype  $\frac{1}{2}$  CNC machine

In indirect mode the teletype is connected to the main computer allowing access to the NC system functions. A papertape may also be punched once having passed through the systems' diagnostic. Existing tapes read through the teletype may be edited and modified to produce new programs.

In direct mode the teletype terminal is a single I/O device to the CNC machine themselves. Papertapes are read by the teletype and processed by the CNC to produce the actual tool.

After the installation of the NC software system there appeared one major flaw; the feel of the NC workshop was absent from the terminal classroom. Therefore, certain aspects of the instructional cause were too abstract for the mechanical minded student. Among the visual aid tools available at Boys Town Jerusalem is a video tape recorder system complete with video tape camera. The decision was made to make use of the VTR for the NC course. The NC instructor filmed basic NC machine drilling movements in three dimensions, i.e., circle, straight line, angle depth, mathematical curves, ellipses, tangent circles, spiral, loops and subroutines. As the students learned the programming instructions for their operation, they viewed the tapes to see the actual drilling movement in execution. Subsequently, when the success of this was apparent, the instructor began taping complete tool processes. With the help of the PAUSE on the VTR and a giant keyboard interfaced to the computer, the instructor would show the original source program, the block simulation of the program on the VTR monitor, and would then switch to the viewing of the tape portraying the execution of that particular block.

Future enhancements of the system include:

Graphic display — Simulation

- a. Plotter Printer
- b. CRT Graphic display

The Graphic Display Simulation System is in its final development stages. The system entails two output devices which display or draw the tool to be milled, drilled or lathed in three dimensions on a point plotter and/or a very high resolution graphics display terminal. The savings involved in reducing the expense of actual milling of tools for testing and teaching purposes is phenomenal.

Since our school is located in Israel the primary language is Hebrew. Special considerations were made in writing our system for an English speaking user or a Hebrew speaking one. To aid in making our decision, we consulted experts in the NC field and educators in the vocational discipline. The overwhelming opinion was to develop the system for the English speaking user. The students are given a special course in technical English to supplement the course already given. The students' command of the language is also strengthened in addition with industries standards. The drawbacks in the first weeks of instruction was the pace of the students understanding. To aid the students in the use of the system, a specially prepared user's manual was published jointly by the two

***It is the educator's responsibility to give students the intellectual tools involved in complex problem solving.***

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discussed in the next section), they all exhibit distinctive characteristics. PLATO was designed to be a large-scale system with remote terminals which featured a high resolution plasma screen and a touch panel (Alpert & Bitzer, 1970; Smith & Sherwood, 1968). The IBM 1500 system was a local time-sharing system and involved terminals with lightpens and random-access slide/audio units. It was developed primarily as a vehicle for research and development in computer-based instruction rather than as a system for widespread implementation. The TICCIT system was also a local timesharing system but used color TVs and had video capability. All three had their own authoring languages: Tutor (PLATO), Coursewriter (1500), and APT (TICCIT). Both PLATO and TICCIT had the delivery of cost-effective CAI as their design goals: PLATO by means of many terminals and TICCIT by virtue of using off-the-shelf hardware components.

While each of these three systems differed in design, TICCIT was fundamentally different from PLATO and the 1500. It was based upon a unique instructional framework which dictated the actual form of the hardware, software and courseware (Bunderson, 1974; Merrill, Schneider & Fletcher, 1980). This framework involved componentized instruction (e.g., objectives, rules, examples, practice, etc.) which the learner was able to control. Furthermore, APT was really an authoring system rather than an author language such as Tutor or Coursewriter (see discussion in Section V below).

The significance of most of the prototype systems discussed in this section was that they provided opportunities for a large number of individuals to gain practical experience with CBI, often in operational settings. In fact, it is probably the case that the majority of CBI professionals in the field today "cut their teeth" on one of these systems. They also led to many instructional theories and principles which were then applied to other CBI systems. PLATO and TICCIT survived to become commercial products (of Control Data Corp., and Hazeltine Corp., respectively) and used in operational educational and training settings. IBM's Coursewriter evolved into the Interactive Instructional System (IIS) widely used on IBM mainframes.

While many other systems have been developed in the past two decades (including microcomputers), few have really incorporated any features or ideas significantly different from these three major systems. One exception is systems based upon videodisc (Kearsley, 1981; Molnar, 1980). Videodisc represents an extension of the multimedia and interactive capabilities of original CBI software. It has made possible novel approaches to information presentation and storage such as Spatial Data Management which is now being investigated for its instructional value (HumRRO, 1982). Another exception is systems designed to exploit the capabilities of new languages such as SMALLTALK and ICAI programs (discussed below). These systems include features such as concurrent processing, overlapping windows, dynamic graphics (animation), and cursor control (via a mouse) which open up new possibilities for CBI (e.g., Wadlow, 1981).

## II. CONCEPTUAL DEMONSTRATIONS

The projects described in the previous section focused on instruction, whereas the studies examined in this section focus on creating novel learning environments for the student.

Perhaps best known of these efforts is the MIT LOGO project (Papert, 1980). LOGO was developed as a tool to help children learn procedural thinking and practice problem-solving skills (Particularly "debugging"). Over the past decade, thousands of children have used LOGO and its physical incarnation, the "turtle" (e.g., Abelson & DiSessa, 1981). LOGO has also served as a vehicle for studying the cognitive processes of children (e.g., Emanuel & Weir, 1976; Watt, 1979).

The SMALLTALK project of Xerox Palo Alto Research Center (Kay &



Goldberg, 1977; Goldberg & Ross, 1981) is similar in a number of respects to the LOGO effort. It is an attempt to develop an easy-to-use, high-level programming language (SMALLTALK). While the original development thrust was the creation of a learning environment for children with particular emphasis on high quality graphics, current applications of SMALLTALK have gone beyond educational contexts.

The SOLO project at the University of Pittsburgh (Dwyer, 1974) was an attempt to let high school students "solo" with computers, i.e., learn to use computers as personal tools. Students developed programs and built computer-controlled apparatus to explore chemistry, ecology, aviation, music, and a host of other domains. The SOLO project gave rise to the SOLONET project — an attempt to foster the same sort of creativity in the context of group activities and interconnected microcomputer networks.

The focus of the Huntington project which began at the Polytechnic Institute of Brooklyn, and was continued at the SUNY, was to develop simulations for use in high school science (Visich & Braun, 1974). These simulations were written in BASIC and widely disseminated (see discussion of CONDUIT in Section VII). It is estimated that the programs were used in over 400 schools by 600 teachers and 25,000 students. The simulations served as models of how computers could be used for science teaching and also helped promote the use of BASIC. In fact, much of the simulation software now available on microcomputers derives from the Huntington work.

The projects of Alfred Bork at the University of California, Irvine, stressed the importance of interactive graphics (Bork, 1977; 1981). Bork demonstrated that such graphics helped students to understand complex relationships in learning college physics. His work has encouraged the use of interactive graphics in CBI learning materials. Bork also emphasized the importance of creating a *dialog* between the student and program rather than a one-way flow of information.

All of these projects, in one way or another, were attempts to show how computers could be used as a tool of the student (e.g., Luehrmann, 1980; Peele, 1979). In a sense they were all reactions or alternatives to the original philosophy of CAI in which computers were used to *deliver* instruction. Collectively, these projects were largely responsible for catalyzing the "computer literacy" movement (e.g., Seidel, Anderson & Hunter, 1982).

**Table I.**  
**SUMMARY OF CBI PROJECTS**

## **I. Development of Prototypes**

- Stanford Drill & Practice Programs (Suppes & Morningstar, 1972; Suppes, *et al.*, 1968)
- BIP (Barr, *et al.*, 1975)
- MISS (Sanders, *et al.*, 1976)
- CASTE (Pask & Scott, 1972)
- PLATO (Alpert & Bitzer, 1970; Smith & Sherwood, 1968)
- TICCIT (Bunderson, 1974; Merrill, *et al.*, 1980)
- Interactive Videodisc (Kearsley, 1981; Molnar, 1980)
- Spatial Data Management (HumRRO, 1982)

## **II. Conceptual Demonstrations**

- LOGO (Papert, 1980; Watt, 1979)
- SOLO (Dwyer, 1974)
- SMALLTALK (Kay & Goldberg, 1977)
- Huntington Simulations (Visich & Braun, 1974)
- Irvine Physics Curriculum (Bork, 1981)
- Computer Literacy (Luehrmann, 1972, Seidel, *et al.*, 1982)

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### III. Major Implementations and Evaluations

- PLATO, TICCIT (Alderman, Appel & Murphy, 1978)  
Philadelphia Schools (Charp, 1969)  
CCC Curriculum (Macken & Suppes, 1976; Poulson & Macken, 1978)  
NDPCAL (Fielden & Pearson, 1978); Hooper, 1977)  
MEP (Fothergill, 1982)

### IV. Dissemination

- Entelek Inc.  
CAI/CMI Catalog (Lekan, 1968; Wang, 1976)  
Microcomputer Software Directories (Skarbek, 1980; Sterling Swift, 1981)  
MicroSIFT/RICE (Edwards, 1980)  
HumRRO (Hunter, *et al.*, 1975; Seidel & Rubin, 1977; Seidel, Anderson & Hunter, 1982)  
CONDUIT, MECC, EDUCOM (Brown, *et al.*, 1967)

### V. Authoring Languages and Systems

- Tutor, APT, Coursewriter (Kearsley, 1982)  
PILOT (Starkweather, 1969)  
PLANIT (Feingold, 1968)  
NATAL (Westrom, 1977)  
CDS (Schuyler, 1976)  
AMS (O'Neal & O'Neal, 1979)  
CREATE (Taylor, 1979)

### VI. Intelligent CAI

- SCHOLAR (Carbonell, 1970; Collins, 1977)  
SOPHIE (Brown, Burton & deKleer, 1982)  
WHY (Stevens & Collins, 1980)  
WEST (Brown & Burton, 1979)  
BUGGY (Burton & Brown, 1979)  
STEAMER (Williams, *et al.*, 1981)  
Programming Tutors (Goldstein, 1979; Miller, 1979; Soloway, *et al.*, 1982)

### VII. Innovative Environments

- CARE (Cartwright & Cartwright, 1972)  
HOMEWORK (CDC Plato)  
Prisions (Siegel, 1979; Diem & Fairweather, 1980)  
Waterford (Bunderson, 1982), Lamplighter Schools  
Lawrence Hall, Capital Childrens Museum (Brown, 1981)  
Sesame Place (Tommervik, 1981)  
ComputerTown USA (Loop, 1982)

### VIII. New Theory

- Learner Control (Merrill, 1975; Seidel, *et al.*, 1978)  
Cost/Benefits Analysis (Kopstein & Seidel, 1968; Seidel & Wagner, 1979)  
Adaptive Testing (Weiss, 1979)  
Simulations/Games (Malone, 1981)  
Work Models (Bunderson, *et al.*, 1981)

Article to be continued: February 1983



# Some Policy Issues in Computing Education in England and Europe

BY PATRICK G. RAYMONT

## Introduction

Those of us concerned with strategic issues in the field of computer education seem, even to ourselves, to be stumbling along in the dark with no clear goals and no signposts to help us to find the right direction. The aim of this paper is to explore some of the policy matters which we have recently tackled in England, and to compare our solutions with some different solutions evolved in other European countries where these relate. Some of the discussion may provide useful insights to policy makers elsewhere in evolving strategies to suit their own circumstances.

There are two general factors which affect the thinking about computer education policy to which it is useful to draw attention from the outset. The first of these concerns the political control of the education system, which varies widely from country to country. In England it is very much a matter for local autonomy and in other countries such as France it is tightly controlled on a national basis. The position on this clearly imposes constraints on the ways in which policies can be implemented.

The second factor is the tradition in a country in respect of vocational education at the post-secondary level. In England, there is a strong tradition of associating vocational education with employment, through apprenticeship for example, or by day release training given to employees of companies at local education colleges.

In other countries, e.g. Holland, the tradition is very much that vocational education is completed on a full time basis before entering employment. Although computing is not particularly bound by traditions, none the less the standard practices in this respect do shape some policy decisions.

A final point of terminology should be noted to avoid confusion concerning the British education and training system. In this article, when we refer to "England", we mean essentially the system which prevails in England and Wales. The system in Scotland is often markedly different to that in England, and in Northern Ireland there are also some minor differences.

## Computers in Primary and Secondary Schools

In the primary and secondary school sector, there have been a number of national programmes in Europe aimed at promoting the use of computers in the schools. In England, a \$16 million Micro-electronics Education Programme (MEP) has been mounted by the Department of Education and Science, and also the Department of Industry has made money available to supply a microcomputer to every secondary school. The activities which the MEP programme carries out fall into three categories, namely; curriculum development, teacher training, and resource organization. In point of fact, the majority of the money has been spent under the resource organization heading, which has involved the setting up of 14 regional centres around the country, each with a small team of experts to give advice and help to teachers in their region.

There have been a number of criticisms of the way in which this programme has been operated. It has been argued that there is no coherent philosophy on how micros are to be used in the schools which would give direction to the programme, although in practice the greatest emphasis has been on teaching subjects other than computing itself. It has also been argued that the major impediment to the use of computers in schools has been the lack of suitable courseware and that insufficient attention has been given by the programme to

***The aim is to explore policy matters in England and to compare our solutions with some in other European countries.***

*Patrick G. Raymont is Group Manager of Education & Training Strategy at the National Computing Centre in Manchester, England.*



**Obviously the ideal would be to put several micros into all schools, but financial limitations prevent this.**

overcoming this deficiency. On the other hand, the programme has given quite some emphasis to the training of school teachers and, in particular, a package of materials called INPUT has been created and used by the regional centres and others to conduct courses for all schools who have obtained equipment through the Department of Industry scheme.

The philosophy of providing every school with a micro has been contrasted with the French philosophy of putting a number of micros into a few selected schools. Obviously the ideal would be to put several micros into all schools but financial limitations prevent this. It has been said that one can really do very little with a single micro in a school but, on the other hand, the provision of one micro often stimulates teachers to become interested and to seek other finance to add to the number of machines. There is currently provision being made to extend the scheme to allow secondary schools to purchase further machines and to include primary schools, but again there are many doubts on the usefulness and practicality of this last measure.

### **Post-secondary Vocational Education**

The Author has recently completed an examination of some post-secondary computing education schemes in Europe. Amongst the schemes examined in some detail were:

- 1) The Higher National Certificate & Diploma courses in Computer Studies, offered under the supervision of the Business & Technician Education Councils in Colleges and Polytechnics in England.
- 2) The courses in Management Informatics given in Colleges for Business and Management Studies in the Netherlands.
- 3) EDP-Assistant courses under the supervision of the Ministry of Education in Denmark.
- 4) The Wirtschaft-Informatiker courses proposed by the Federal Institute for Vocational Training in West Germany.

It is remarkable that in spite of the quite independent developments of all these courses, there appears to be a common core of material which applies to most of them at least as far as the computing subject matter is concerned.

In broad terms, this core consists of:

- 1) Some fundamental understanding of computing hardware
- 2) A good coverage of software engineering concepts
- 3) A thorough treatment of COBOL programming
- 4) Some exposure to other programming languages
- 5) A knowledge of the basic skills of systems analysis & design
- 6) A good knowledge of systems software
- 7) A basic knowledge of database and teleprocessing

Also clear is the importance of a good basic knowledge of administrative management and accounting. The need for good (human) communication skills to be developed is also commonly recognised.

There is, however, some disagreement on the supporting curriculum which should be offered, particularly in respect of the amount of Mathematics to be included and on the importance of studying the social impact of computing.

Traditionally, the teaching of computing and of mathematics have been associated with one another, thus giving rise to curricula in computing with a heavy mathematical content. However, from the employer's point of view, this is quite wrong since most computing staff are employed on work with practically no mathematical content. It is sometimes argued that programming and mathematics require the same kind of mind, but this would only provide an argument for selecting students on the basis of their demonstrated mathematical ability. Even this is doubtful since an English study has shown a closer correlation between English Language ability and Programming achievement than between Mathematics and Programming. An argument used by those who want to include a lot of mathematics, that



practical programming exercises need to be mathematically orientated if they are to be of the right degree of difficulty, lacks conviction; many problems of file handling, for example, are logically very complex but mathematically simple.

There is a case for teaching some operational research topics on computing courses (e.g., inventory control) because these arise in the practical application of computers in business and industry, but the mathematics can be kept simple even here. We conclude that most of the courses surveyed in this report, quite correctly limit the mathematical content of the curriculum and have as a main thread the ability to handle simple mathematical models of business or industrial situations.

It is clearly recognised that vocational computing courses need a content of business studies. In some cases an easy approach to providing this has been to incorporate some traditional business topic (e.g., economics, law) directly into the computing courses. This is not very satisfactory since the relevance of the studies is doubtful and student motivation is adversely affected. A more appropriate approach would seem to be to devise a business content based around administrative (and especially accounting) procedures which relate to the practical use of computing. There is no example in the courses studied in this report where this appears to have been done satisfactorily.

Most courses put some emphasis on human communication skills, but again, it is not clear that the actual teaching of these skills has the necessary practical computing bias.

A final point on supporting content refers to the social impact of computing. Of the courses studied, only the Danish course gives any significant attention to this topic, perhaps reflecting the generally greater measure of concern for the issues involved in the Scandinavian countries and reflected in legislation governing the introduction of new technology in those countries. As other countries follow this lead, the appropriate subject matter will need to be introduced in all their courses.

There appears to be a major gap in the current provision caused by the sudden explosive growth of office technology. It is clear that business and industry are going to require a substantial number of people educated to deal with the implementation of office automation systems which will require a combination of skills which goes beyond the requirement for computerisation as we have known it in the past. For example, a broad knowledge of office procedures will be required together with a knowledge of a range of office equipment (e.g., word processors) not normally studied on computer courses.

There does not appear to have been any substantial curriculum development anywhere in Europe to cater for the development of vocational education in this field and it is clearly an urgent matter to get some work done on this. A start has been made in England by the Business & Technician Education Councils, but in relation to re-training courses for those with considerable experience, rather than with education programmes for school leavers.

Another aspect of the post-secondary vocational education scene is the level at which the courses are set. Generally, in England and Europe, this has been on the theoretical side equivalent to the first year or two of a University Degree course, with the addition of some practical work, particularly in computer programming. Employers mostly use the output from this course in programmer/analyst or systems programming jobs and although the student will normally start working with a trainee status, the probability is of accelerated promotion.

Employers seem to have found the output of these courses very useful, particularly those who use computers principally for commercial purposes. However, it may be that an alternative level would also provide useful people. For example, there are jobs in computer operating, data control and maintenance.

## **A study shows closer correlation between Language ability and Programming achievement than between Math and Programming.**



### **Vocational computing courses need a content of business studies.**

nance programming (to give just three examples) which require considerably less ability and knowledge than the programmer/analyst or systems programmer jobs.

In England, there has been a new course organised by the Business & Technician Education Councils which leads to a qualification of about University entry level, with particular emphasis on the skills of operating and programming.

The first course only began in 1979 and so it is too early to fully evaluate this course, but the early indications are that employers find the output from the course very useful for some of the more routine work in computer installations, especially those of small to medium size.

In the long run, the vocational education system will need to produce a balanced supply of people educated at various levels to meet the needs of employers. It is not easy to plan this, particularly in view of the long time scales needed to make educational innovations and the rapidity of change in computing, leading to continual new job requirements.

In England and in Europe, there is some suspicion on the part of employers of the computing education offered in Universities and Polytechnics, because computing is seen as essentially a practical art and experience is valued more than qualifications. It is, therefore, important that courses in computing offer a significant practical content and employers certainly recognise courses which include periods of industrial training as being of particular value. In England, the Polytechnics in particular have run a significant number of three or four year programmes which include one year spent working in industry and the Manpower Services Commission have also sponsored training of about one year's duration with roughly half the time spent working in industry.

These forms of education are perhaps more difficult to organise, but none the less provide significant advantages.

#### **Some Problems of Resourcing**

The whole field of computing is subject to very rapid change which makes it difficult for educational institutions to resource courses which are relevant to current industrial needs. There are two particular aspects of the resource problem in this connection.

The first is the equipment problem. It is imperative that educational institutions, especially those with a vocational bias, should be equipped with computers and related devices of types which are not too old-fashioned compared to those in use in business and industry. This can put substantial strains on budgets which are often modelled on budgets for more static subject areas. However, the falling costs of hardware, especially as measured on a price/performance basis, should progressively ease this problem.

The second and far more serious problem is that of the teaching and support staff required to run effective computing courses. There has been a continuous shortage, on an international scale, of skilled computing staff for some years, resulting in such staff being highly rewarded in industry and business. Furthermore, computer staff generally wish to keep up-to-date and in touch with the most recent developments in computing. In the industrial and business world employers actually support quite a lot of expensive technical up-dating training. Educational institutions find it hard to match this and hence find it very hard to attract and retain staff of the appropriate calibre.

As an example of the problem, a recent survey in England showed that Polytechnic staff vacancies were 17% of establishment and that because of financial constraints, recruitment to fill half of the vacant posts was banned.

Furthermore, in local Colleges, vacancies were 23% of establishment but these establishments were themselves only 60% of what the Government Inspectors regarded as necessary to run the courses scheduled in those Colleges. At the national planning level, little seems to have been done in any country to



overcome the staffing problem and at institutional level, there is little leeway to allow local solutions. The following measures which have been tried on a very restricted basis are listed as possible strategies which can usefully be introduced.

- 1) The provision of manufacturers courses for teachers
- 2) Arrangements for seconding teachers to industry with locum staff being available to fill the gaps
- 3) The provision of support staff to ease the load on academic staff (e.g., programmers to conduct "clinic" sessions to help students with programming problems)
- 4) Special grading schemes to give a higher ratio of Senior to Junior posts in computing
- 5) Full funded Summer Schools to enable teachers to up-date their knowledge
- 6) Central provision of audio visual and other teaching aids
- 7) Special recognition for the extensive curriculum development activity needed to keep courses up-to-date

It is recognised that many of these suggestions would be costly to implement but they would help a lot in enabling the educational sector to produce people with the up-to-date knowledge and skills needed in industry and business.

***Skilled computing staff are highly rewarded in industry. Educational institutions find it hard to match this.***

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### **Numerical Control: continued from page 89**

departments. The manual includes all the necessary technical information needed by the user to operate the NC software system. Examples of possible common errors with their error messages and corrections are in the manual. It is a description of the system from a user point of view, thereby allowing not only BTJ students to use it but anyone versed in NC may access and use the system.

### **Evaluation and Conclusion**

Our CNC educational program is in classroom use for three school years. The first two years were of an experimental nature. The third year has received total recognition from the Israel Ministry of Education. Five vocational high schools have joined our program sending their students for two hours a week of instruction by our staff here at Boys Town Jerusalem. Five hundred and forty two students will have completed the course by June 1982. This year they will qualify for a newly established matriculation exam on Numerical Control styled after our syllabus. The interest in the system continues to grow. In May 1980, at the request of the Ministry of Education, we held a one-day Seminar of Instruction CNC for 26 NC teachers from vocational high schools throughout the country. Reactions to the course program were favorable; the teachers expressed interest in acquiring a similar system for their schools.

As a result of this successful endeavor, our system development group is now examining the feasibility of developing a similar program with the Electronics department to teach Real-Time programming within the syllabus of the microcomputer course given at the Junior College. We feel that we have substantially attained our goals defined at the outset. The project, from its inception to completion, has remained true to the educational standard we chose for it. Ultimately it is our students who already have and will continue to benefit from it.

Software was designed and developed by H. Joshua Klein  
Research for Mechanical Engineering by Moshe Blumenthal

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# Management-Oriented Systems Design Method at IIT in Japan

BY TOSHIO NISHIMURA

## ABSTRACT

Twenty years have passed since the first installation of computer in the industrial field in Japan. In these years, many systems based on computers have widely spread throughout the business field. And the roles of systems engineer have been changed. Under those circumstances, we developed a new method of systems design, named MASD (Management Oriented Systems Design Method). IIT (Institute of Information Technology) has been presenting this method for the last six years as one of its main training courses. It has been proven that trainees can obtain the ability of thinking systematically with a broad outlook and the faculty and attitudes through this training.

## Introduction

Every business enterprise faces a lot of problems which keep clamoring for proper attention and solution. And we can not think of a single business corporation immune from problems. So, we may well define a business enterprise as an area of human activities where all kinds of problems converge. It is therefore no wonder that enterprises are always looking for warp and means to solve the problems and try constantly to recruit and develop the personal capability of working out desired solutions.

Affected by the surrounding world and society which are becoming increasingly more complex, the problems that the enterprises face today are becoming likewise more complicated and difficult. This is the reason why the need for a systematic approach and method of problem solving is now keenly felt in all phases of business activities.

## Systems For Problem Solutions

Twenty years has passed since the Japanese industry started the use of computers. These years witnessed the fast accumulation of valuable experiences by industry and the application of computers has grown intensively and extensively, even in the farthest corner of Japanese business activities.

It seems that we have come to a junction where we should pause for a moment of reflection, asking ourselves anew: "what is a computer for an enterprise?" The answers to this question may differ for individual enterprises, but, if the enterprises are understood to be areas where problems converge, computers are best recognized as a "TOOL" for problem solving and can be best utilized as such. Nevertheless, we very often find an elaborate system of computers developed for data processing with no intent to go beyond that. Even in such a case, where an information system is developed on top of data processing operation, we find more often than not that those who designed the system are unaware that they have developed "a system for solution of problems". It is true that many systems design works were made without intent to formulate "a system which would directly contribute to the solution of problems". Such practice is obviously wrong and should be regarded as a deviation from the Right Track; such off-set has its roots in the education and training of systems design engineers. The education is either too much computer oriented, or it has given too much emphasis on detailed design art or techniques. As a result of such unbalanced formation, systems designers tend to give the greater part of their attention to the features and capabilities of individual computers than to the suitability of the system he is designing for a particular purpose or goal. Sometimes he is only interested in developing an elaborate system to do more sophisticated data processing. From our stand-

**20 years have witnessed the application of computers extensively in business.**

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point the solution of the problem is the heart of the issue; the computer should always remain a "TOOL". So, it is important to impart to the students and trainees all the knowledge about the computer and its operations, but it is even more important to develop their abilities to find out systematic ways of solving problems.

In other words, they should be so trained that they can first identify and define what are the real problems in the actual business activities and then they should be able to develop a new system to replace the existing one which has been the source of problems. We call such an approach "the systems design of actual business systems", which, we believe, is the prerequisite for the meaningful and profitable use of computers. It is a concept or methodology for fruitful systems designing which the systems engineer should thoroughly get acquainted with during the period of professional formation.

***Systems designers should first identify the real problems in business activities before developing new systems.***

### **Development Of A New Method**

In most business organizations, the people in charge of computer works belong to a data processing section or department. What expectations does the manager of such an outfit entertain for the members of his group, who are usually called "the systems engineers"? The minimum requirement is said to be knowledge and aptitude for EDP systems. This is the reason why the education of systems engineers has become heavily computer-oriented, placing major emphasis on the EDP system in itself and not giving much heed to the fact it is only a means to an end.

We have long doubted the validity of such concepts and resultant training programs. Discontent with traditional ones, we keenly felt the need to develop a new concept and method streamlined and geared to the attainment of goals, which is the "systematic solution of problems".

The new concept and methodology first had to be clarified in order to lay a solid foundation on which to develop a new curriculum for systems engineer education.

We proceeded precisely along this line; we first pinpointed the major issues and activities, then developed a new concept, procedure and method of systems engineering with the help received from our research associates. Whatever results we could obtain from research and discussion, we were very quick to apply in the actual business situations to test their validity and usefulness. The end results thus obtained are no longer so computer-oriented as was in the past, and aim to solve the problems that really exist in the particular systems of business activities, which is termed "actual business system". The new approach starts from the design work of "actual business system". It can then proceed to other design works, for instance, the development of such systems as information systems and EDP systems.

Each of these design stages can be architecturally combined to form an integrated whole. Since many enterprises have grown ill at ease with traditional concepts and method, a great many EDP managers rallied to support us when our new concept and methods were made known to them. They readily put the new way to the test in their actual operations and we have now several hundred cases of actual applications. Needless to say, many improvements and corrections were made during the rest period and we may safely say that the new concept and method have fully matured. The name given to it is "MASD", which stands for "Management-Oriented Systems Design Method".

### **The Effective Use Of MASD In IIT's Training Course**

I have long maintained that the qualifications of a systems engineer can be summarized and expressed in four key words; "attitude", "knowledge", "technology" and "experience". The first word "attitude" is of particular importance because every candidate for systems engineering must acquire an



**Qualifications of a systems engineer are attitude, knowledge, technology, and experience.**

appropriate attitude, which consists of a keen consciousness of the problem, a sharp grasp of purpose and tenacity to build up an integral whole. Without fostering such an attitude within himself, it would be impossible for a systems engineer to meet the real requirements of business activities, however much he is versed in "knowledge" and "technology".

IIT (Institute of Information Technology) is a non-profitable organization, which was established under the report of the advisory committee of the government (Ministry of International Trade and Industry: MITI) in 1970. The report emphasized the necessity to foster a great number of specialists such as systems engineers and senior programmers to cope with the rapid development in the field of information processing in Japan.

It was in 1976 that IIT inaugurated the training course presenting MASD for systems engineers. We are now just in the 7th year of operations to commence the 14th course of training. The aim of the course is to help the trainees to acquire professional sense, mind and capability for systems design engineering. Such an aim can be attained only when the trainees are properly led to grow in the four key area "attitude", "knowledge", "technology" and "experience", which are to be obtained through case studies.

The principles and methods underlying this course are the same as those developed in the "MASD", and one feature of the course is in the fact that the curriculum evolve strictly in accordance with the design procedures set forth in "MASD".

About two hundred and fifty persons have already participated in this training and almost all of them admit its effectiveness and usefulness. They say that their vision was considerably expanded and that their practical experience gained reinforcement. Such good results can be ascribed to the unique feature of "MASD", which is based on the deductive method of systems approach and has systems design procedures that starts from the design of "business actual system".

The cordial and enthusiastic reception of the new course by the trainees is indicative of the shortcoming inherent in the traditional systems design activities. They were too much computer-oriented, restricting themselves into narrow bounds. In other words, we were led to learn that the systems design activities should be the goal-oriented instead of being means-oriented.

The outline of the curricula of this training course is as follows.

### **Curriculum**

1. Orientation (24hrs)
  - 1-1 System's concept and system design
  - 1-2 Function of system engineer
  - 1-3 System, information and computer
  - 1-4 Management and information system
  - 1-5 Systematization and project management
  - 1-6 Management information systems and management science
2. Process of system design (12hrs)
  - 2-1 How to approach to system design and system engineer's attitude
  - 2-2 Inductive and deductive method in system design
  - 2-3 Procedure of system design by MASD
  - 2-4 Activity of team-work
3. Analysis technique of management oriented system (9hrs)
  - 3-1 Concept of management oriented system
  - 3-2 Analysis approach for management oriented system
  - 3-3 Analysis technique for management oriented system
  - 3-4 Exercise of analysis for management oriented system
4. Design of management oriented system (24hrs)



- 4-1 Setting up functions of system
- 4-2 Setting up ideal system
- 4-3 Design of feasible total system and sub-systems
- 4-4 Evaluation and proposal of system
5. System evaluation method (3hrs)
  - 5-1 Several methods for system evaluation
  - 5-2 Cost and profit evaluation technique for system
  - 5-3 Technique of quantitative and qualitative evaluation for system
6. Communication technology (6hrs)
  - 6-1 Problem solving and communication
  - 6-2 Survey method
  - 6-3 Documentation technique
  - 6-4 Presentation technique
7. Orientation of training assembly (6hrs)
  - 3-day-2-night training assembly
    - (1) Formation of common understanding in study groups
    - (2) Design of management oriented system
    - (3) Presentations, discussions and mutual evaluations
8. Review and recompletion of management oriented system (6hrs)
9. Design of information system (30hrs)
  - 9-1 Concepts of information system and relation between information system and management oriented system
  - 9-2 Contributing function and operating function of information system
  - 9-3 Procedure and design technique for information system
10. Method and case of management science (12hrs)
11. Orientation of training assembly (6hrs)
  - 3-day-2-night training assembly
    - (1) Information system design and utilization for automatization
    - (2) Design of man-machine information system
    - (3) Presentations, discussions and mutual evaluation
12. Review and recompletion of information system (6hrs)
13. Design of on-line system (15hrs)
  - 13-1 Concept and forms of on-line system
  - 13-2 Hardware and software for on-line system
  - 13-3 View point for on-line system's design
  - 13-4 Case study of on-line system
14. Case study of computer based accounting system (6hrs)
15. Design of EDP-system (21hrs)
  - 15-1 Position of EDP-system in system design
  - 15-2 Procedure of EDP-system design
  - 15-3 Documentation of EDP-system design
  - 15-4 Case study of EDP-system design — sales system
16. Auditing of EDP-system and its trend (3hrs)
17. Office Automations (3hrs)
18. Software — its presence and possibility (6hrs)
19. Hardware — its presence and possibility (6hrs)
20. Future subject and direction of department of information processing (6hrs)

### The Features of MASD

The "MASD" is a newly developed method with an intention to overcome the short coming inherent in the traditional method. Its major feature can be described as follows.



**Traditional systems  
design activities were  
too computer-oriented.**

**It focuses attention on "actual business systems".**

The "MASD" aims to solve a problem. It first selects a certain area of business activities where the particular problem arises. It aims to solve the problems by replacing the existing system with a new system in which the causes of the problem are carefully eliminated. It is in this context that a new concept of "actual business systems" was introduced. This comprises all functions related to particular business activities. The entire method is new simply because it is entirely geared to the solution of problems.

**It places emphasis on function.**

We maintain that a system is a scheme within the frame of which the functions are performed. Therefore, in the new method it is strongly urged to make a thorough analysis of functions prior to systems design works. The new system must be a scheme with such frame work that will help the functions. Function effectively and efficiently, because of such analysis on Functions, the "MASD" prescribes the functional design procedures, which is called "Horizontal development of analyzed functions".

**Employment of both deductive and inductive methods.**

The deductive and inductive methods are two methods that can be employed of the systems design procedures. We may well say that the earlier practice has given more weight to the inductive method, while in our "MASD" both methods are regarded equally important. They appear under different terminology in our "MASD". The deductive method is called "the goal-oriented method", while the inductive method if named "status-quo-oriented method". In the earlier stages of "MASD" procedures, a heavy emphasis is given to the "goal-oriented method" and to the attitude and techniques peculiar to this method. Such goal-oriented attitude has to be maintained throughout all stages to the very end of design activities, so as to make the end results as practical as possible. Such arrangement of two different methods in the design procedure has proved to be very helpful in the training of systems engineers because it fosters problem-awareness and a goal-oriented attitude in the minds of trainees.

**Four Basic Steps of design procedure**

What is considered most important in "MASD" is the design of "actual business system". Unless attention is directed to the "actual business system", the information systems or EDP systems that come out as end results of our efforts would not be very practical and useful. Taking this point into consideration, the "MASD" design procedure stipulates four steps.

The first step . . . . The tasks to be performed by the system are defined,

The second step . . . . The actual business system is designed,

The third step . . . . The information system is designed,

The fourth step . . . . The EDP system is designed.

**Maximum use of computer**

Information Systems and EDP systems are clearly understood as two different systems in MASD, but it was not so in past practice. Such a misconception seems to have misled the systems designers of EDP systems to disregard not only organization, but also human beings involved in running the systems.

In the actual business systems, the information must be gathered and made available to the actual functions. So, the information systems must always be designed and installed so long as the actual business system exists. It is true that, whether it is available or not, is irrespective of the computer. In other words, the EDP systems are nothing more than an automated portion of the information systems. This is the basic philosophy of MASD which must be clearly understood. In the earlier practices they were used to start with the



questions: What and How much can be done by a certain type of computer? Our MASD approach is quite different, it first undertakes the review of existing actual systems and then comes to propose the improvement. It is after the actual systems improvement that the design activities of information systems start to meet the requirement of actual business systems. It is usually in this period that the systems designers determine which portion of the information systems should be automated and to what extent. An EDP system that has real value comes out as an end result of such logical deliberations. It is in this way that an excessive and wasteful computerization is avoided. It is also in this way that an excessive and wasteful computerization is avoided. It is also appropriate man and machine interface for the people who will take care of computer operations and maintenance.

**The user is to play a leading role.**

Many people are apt to regard systems engineering as something exclusively pertaining to computer operations. So the majority of people within a business enterprise believe that systems engineering is typically the responsibility of the specialists working for computer operations. Strongly affected by such a notion, the people who belong to the section where a new system is to be installed usually remain passive throughout the design period. They say they are the customer placing an order to the EDP section. Such a notion is entirely wrong. But what is to be designed is a new business actual system to replace the existing one, which has become the source of problems. The objective is to solve the problems. Therefore, the department in charge of the business actual system should assume responsibilities and play a leading role in the systems design activities.

The EDP section or department should support the department or section in charge with its professional knowledge, skill and experience as a systems consultant. This is, in short, the philosophy underlying our MASD. In the actual systems design activities, the people from the said two departments are combined to form a team to work together, each member of the team will have its own role to play with clear-cut responsibility and area of activities where he should display leadership. The relationship between these two departments is thus made very clear and this will serve to make the design activities both effective and efficient.

## **Conclusion**

In summary, three things must be systematically developed and prepared for the systems design activity. They are concept, procedure and technique. Needless to say, all these are well developed in MASD and what I have stated in this paper is just an explanation of their major features. The concepts and methodology came to the fore a few years ago and were immediately put to the test in actual business scenes. So they can no longer be called new. It is already the seventh year since IIT started a new training course along this line. The method has since grown full and complete. As an educational program it has become a consistent series of case studies starting from the discovery of problems and ending up with the design of EDP systems. The MASD may also be called an IIT method since it was developed under IIT's patronage. It is more than just a tool for education and training. Widely applied in actual business, it has rapidly spread far and wide as a useful tool for systems design activities. It is hoped that, as such, the MASD will continue to provide the sound foundation on which to build effective information processing systems.



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# New Products



**Omninet for IBM** - Fully compatible in hardware and software with the IBM PC, the Corvus Omninet transporter allows the IBM unit to be added to a Corvus Omninet network consisting of up to 63 computers. Omninet is a disk-independent, carrier-sense-multiple-access local network that operates over an end-to-end network length of 4,000 feet at a one million bit per second rate. The system lets users combine multiple microcomputers with different operating systems on one network. *Corvus Systems, Inc., San Jose, CA.*

**Circle No. 345 on Inquiry Card**

## Double Carousel and Cassette Case:

These sturdy cases covered in vinyl and equipped with a handle, fold up and snap together for storage or carrying. Two slide trays fit on a non-rotatable hub in a 3-dimensional pocket with velcro closure flap. The second pocket can also double for placement of accompanying presentation literature. Molded compartments accommodate two cassettes. Variations on this storage/carrying system are also available, including an assortment of vinyl cases for cassettes and filmstrips, and corrugated fiberboard media files for a combination of filmstrips, cassettes, or slide carousels. *The Highsmith Co., Inc., Ft. Atkinson, WI.*

**Circle No. 251 on Inquiry Card**

## Digital's Personal Computer —

Rainbow 100 personal computer has been designed to run both 8- and 16-bit industry-available application software using a dual-processor (Zilog Z80 and Intel 8088) design. This capability, transparent to the user, enables education users to take advantage of the widely available software from a variety of independent suppliers. The system can be used as a stand-alone unit, similar to traditional personal computers; in addition, it can operate as a standard VT 100 terminal connected to a larger host system. *Digital Equipment Corporation, Maynard, MA.*

**Circle No. 217 on Inquiry Card**

## Single Board Microcomputer:

SYM 2 is a single board microcomputer suited to the classroom. It can be used either as a tool for teaching microcomputer technology, or in laboratory and control applications in research projects and experiments. The SYM 2 incorporates some of the most requested features: built-in power supply, switches and LEDs for user I/O and cassette interface jacks. Specifications include: SY6502 NMOS 8 bit microprocessor, 28 key keypad, six digit display, 4K byte Supermon resident monitor - user expandable, 1K byte user RAM, user ROM/EPROM socket for BASIC (BAS-1), resident assembler/editor (RAE-1) or custom firmware and RS-232-C compatible serial interface. *Synertek Systems, Santa Clara, CA.*

**Circle No. 228 on Inquiry Card**

**Data Display Monitors** - designed for the personal/small business computers, EDM-926 (9 inch) and EDM-1226 (12 inch) models, offer P-4 white and P-31 green phosphors displays as standard. The monitors feature 750 resolution for clean, crisp character display, simplified operator controls, and scan adjustments from 85% to 105% of display size. *Electrohome Limited, Kitchener, Ontario, Canada.*

**Circle No. 335 on Inquiry Card**

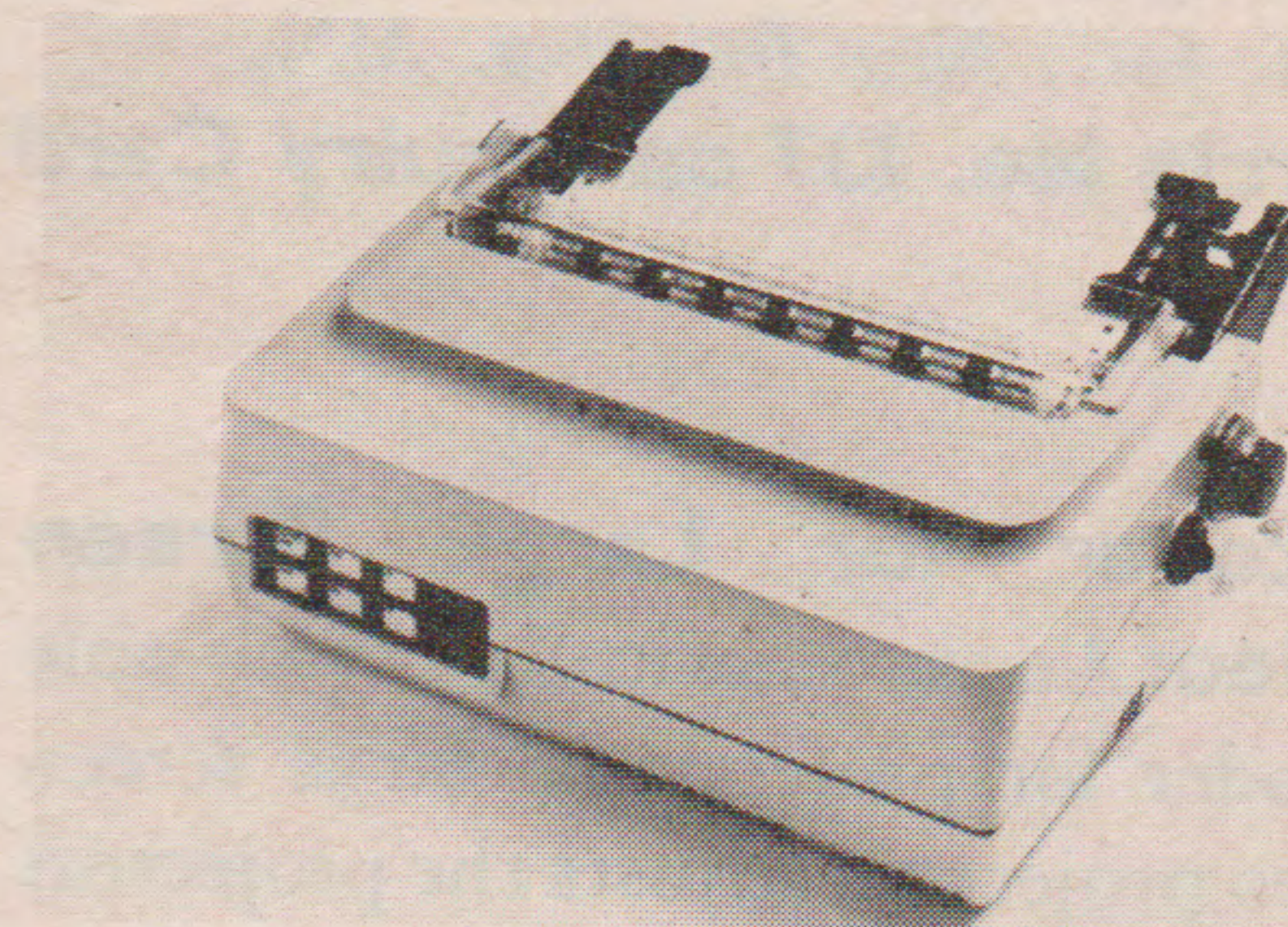
## Memory Expansion for Atari 400

— The Rancran Plus 48K precedes Atari 400 Computers with 49,062 bytes of random access memory in a single module. This upgrades the Atari 400 to the computing power of the Atari 800 and allows for full access to software for the Atari 800. *Axlon, Inc. Sunnyvale, CA.*

**Circle No. 205 on Inquiry Card**

## Matrix Printer for Microcomputers:

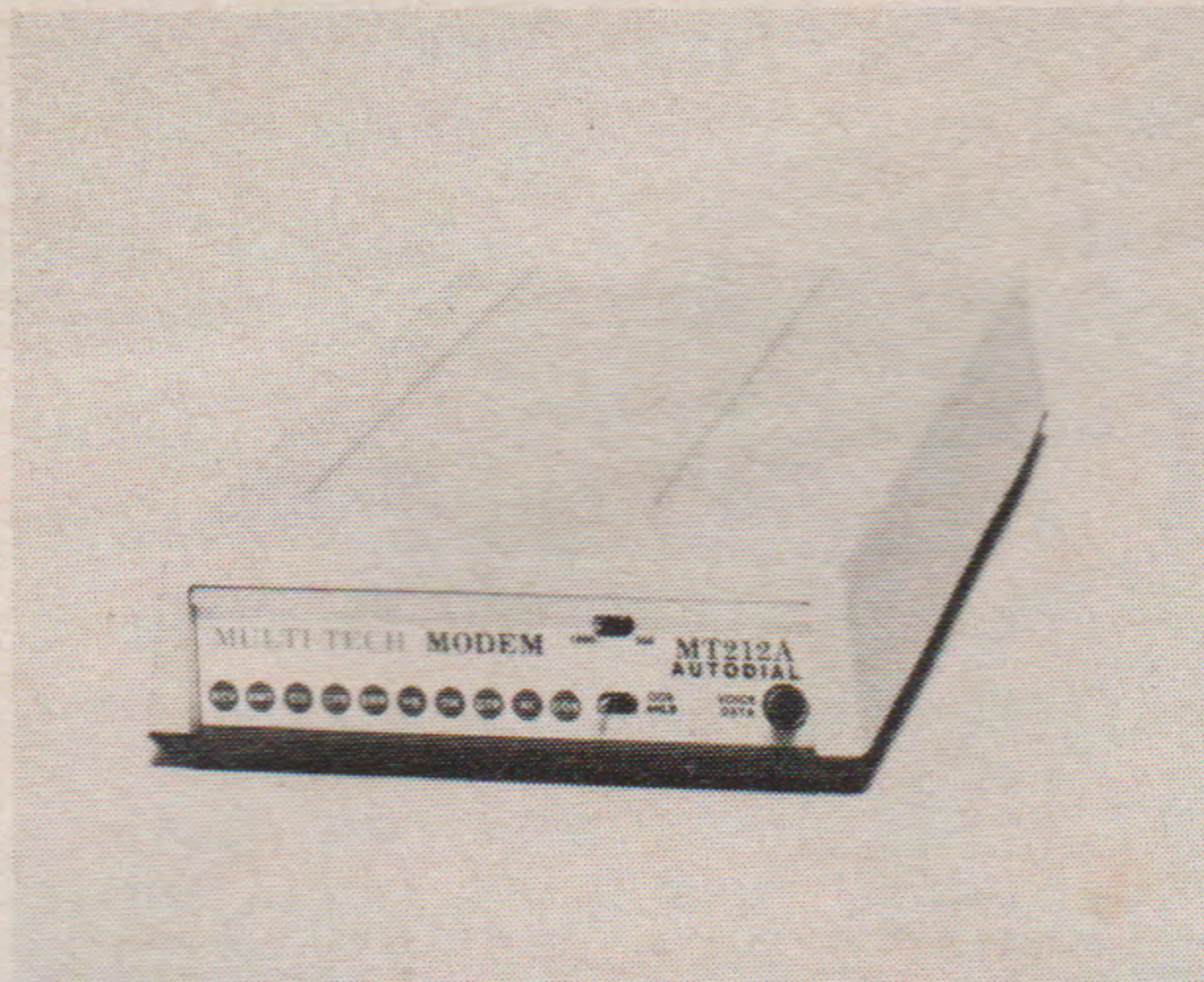
A 160 character per second dot matrix printer for microcomputer users that can be used for word processing, data processing and graphics is available from Mannesmann Tally. The multi-functional MT-160 offers dual mode operation that prints both correspondence quality and high speed data processing text. The 80 column impact printer features a high density 40 x 18 matrix character printed at 40 cps; the data processing mode uses a 9 x 7 matrix character for 160 cps. The data processing mode also features bi-directional logic seeking print head travel and accelerated tabbing to increase throughput. For word processing, the MT 160 L has a report package resident in the machine which provides letter quality characters, proportional spacing,



margin justification, automatic centering and daisy wheel code compatibility. The MT 160 offers dot addressable graphics allowing the user to produce bar charts, pie charts, curves or other images created on a video screen. In addition, the MT 160 features the ability to print four double wide and three compressed print character pitches plus the standard 10 characters per inch. *Mannesmann Tally, Kent, WA.*

**Circle No. 244 on Inquiry Card**





**Autodial Modem — An automatic dialing modem — the MT212A:** Autodial, operating at 1200 and 300 bps. provides full duplex operation over the switched networks and is fully Bell 212A compatible. The MT212A Autodial is capable of storing up to five numbers of up to 25 digits each. Numbers are entered and stored by the user via his terminal keyboard, and are dialed with a single keystroke. The modem is interactive with the user, displaying call status, stored numbers, instructions and other information on the users terminal. Other features standard in the system include pulse or tone dialing, automatic redial and the capability of inserting pauses in the dialing sequence for use with PBX and CBX systems as well as MCI, SPRINT and other long distance phone services. *Multi-Tech Systems, Inc., New Brighton, MN.*

**Circle No. 237 on Inquiry Card**

**Decoder for Large Screen Video:** An automatically switch-able decoder for professional large screen video projectors adjusts the projectors to display input at any one of the three primary television scanning standards used in different parts of the world: NTSC, PAL and SECAM. This enables users to display encoded video tapes, video transmissions, as well as input from video cameras and other software, generated at any of the three standard scanning rates. The new system is equipped with logic circuits that automatically identify input signals and make the adjustments necessary. *General Electric, Syracuse, NY.*

**Circle No. 234 on Inquiry Card**

**Slow Scan TV Transceiver:** can be used for video teleconferencing and general purpose communications. The Model 250 is designed to provide narrowband video communications over standard voice-grade telephone circuits. It has frame freeze capability and converts the frozen picture to a "slow scan" TV signal which is suitable for transmission over audio channels. At the receiving location, it reconverts slow-scan TV signals to a still image on a normal TV monitor.



The 250 comes in a compact case for tabletop use, and includes plug-in circuit cards for simplified maintenance. It will operate in moving vehicles or other environments, has automatic transmit/receive switching, and real time monitoring of A/D operation. *Colorado Video, Inc., Boulder CO.*

**Circle No. 241 on Inquiry Card**

**Bufferboard:** The printer buffer, designed exclusively for the Apple II and III computers, comes standard with 16K of memory, and additional memory chips are available to increase buffering capacity to 32K or 64K. No longer is an entire new interface needed; the Bufferboard fits right into the Apple computer and "docks" onto all popular parallel printer interfaces, including the Grappler/Grapppler+ interfaces, Epson interface and Apple printer interface. With the standard 16K buffer, the Bufferboard holds approximately 5 pages of print. When expanded to 64K, it stores up to 20 full text pages. All Bufferboard features are controlled by its on-board micro controller. The built-in self test automatically reads the number of memory chips installed while testing all on-board components. Its automatic

memory configuration eliminates the need to change switches and settings when additional chips are installed. *Orange Micro, Inc., Yorba Linda, CA.*

**Circle No. 340 on Inquiry Card**

### **BX256 Offers Two Processors and CP/M Compatibility -**

Featuring 256K of user memory (RAM), the BX256 offers two processors, including a 16-bit 8088 for CP/M-86 Release 1 compatibility, an attached 80 column green phosphor screen and built-in dual disc drives. It is expandable to a maximum of 256K RAM internally with potential for 640K externally, and can also accommodate an optional Z-80 processor board for additional inter-microcomputer operating system compatibility. *Commodore Business Machines, Inc., Wayne, PA.*

**Circle No. 330 on Inquiry Card**

### **Microdisk Development System -**

RCA's MS2000 Development System is housed in a compact 12-inch Microboard Industrial Chassis, contains a CMOS CPU, two 32K-byte CMOS memory boards (CDP18S632), a floppy disk controller with DMA capability (CDP18S651), plus a switching power supply (MSIM40), and dual 3.5" Sony MicroFloppy Disk Drives (MSIM50) with 645K bytes of formatted data storage. A serial RS232C port supports a user-provided terminal at baud rates from 300 to 19.2K baud. Four spare card slots allow for system enhancement using any of the Microboard CDP18S600 Series modules. Software features of the MS2000 include the MicroDOS file management and operating system plus the UT70 monitor firmware. MicroDOS contains an editor and assembler (MacroAssembler ASM8) which support the 1802, 1804, 1805, 1806, 6805C plus future RCA microprocessor introductions. *RCA Solid State Division, Somerville, NJ.*

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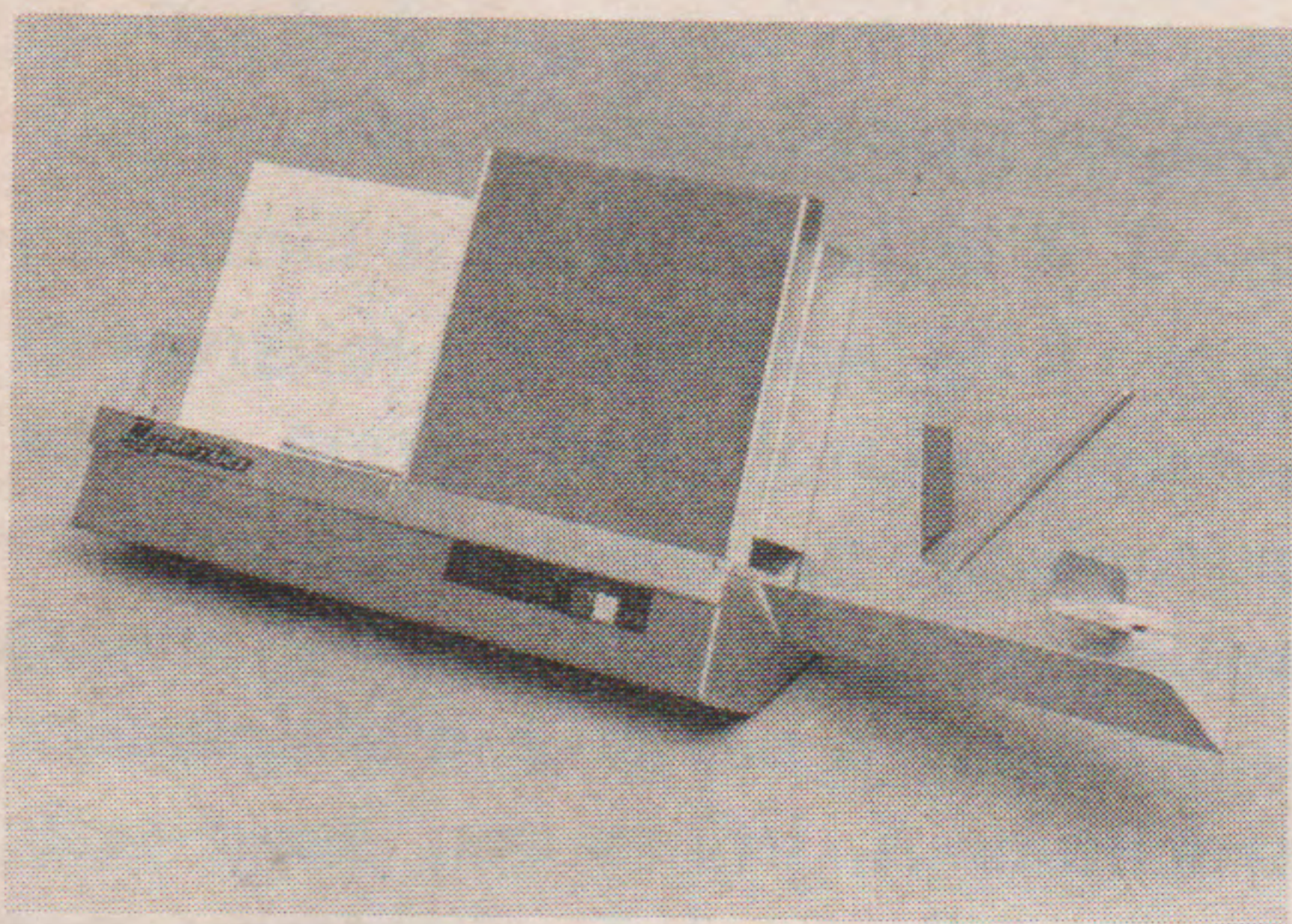
### **New High Speed Linearcorder, Mark VII:**

The Mark VII oscillograph boasts a multi-channel feature of 2, 4, 6, 8 or 12 channels and is available in either roll or z-fold chart models. The Linearcorder Mark VII can accommodate a variety of pre-amplifiers. The unit is totally modular in design and is not motion or altitude sensitive. It can be operated vertically or horizontally. It is compact and lightweight and requires only 19" for rack or bench mounting. *Watanabe Instruments Corp., Costa Mesa, CA.*

**Circle No. 247 on Inquiry Card**

### **OMR/OCR Devices for Educational Data Entry:**

Three new table top Optical Mark Read (OMR) devices designed for speed and accuracy in educational data entry, the OMR/21, OMR/30 and OMR/40 are compact and microprocessor controlled. Each of the OMR devices can be used standalone or online to a computer system. All three are capable of reading documents 2 x 4 inches up to 9 x 12 inches in size. The units check for double feeds by measuring document thickness and length, displaying the status of documents over or under a set tolerance. In addition,



all three can indicate paper jams and adjust for background paper color. Read head sensitivity to marks is adjustable. An LED display advises the operator of status conditions. Each system has its own microprocessor and utilizes the latest in micro-circuitry, including RAM and ROM memory. *Cognitronics Corporation, Stamford, CT.*

**Circle No. 233 on Inquiry Card**



### **DEC VT-100 Alternative —**

GTC's Model SW10 incorporates space-saving compactness and intelligent capabilities, as well as direct access to all terminal operating characteristics via the keyboard rather than switches. The terminal has additional function keys and a printer port with "passthrough" capabilities for interface to a 132-character printer. Its small footprint and light weight (26 lbs.) provide increased portability. Each of the 12 programmable function keys can store 20 character user-defined character/code sequences. The terminal's setup display allows operators to view all standard operation parameters by pressing the "setup" key which automatically calls a plain-English listing of the terminal setup status to the video display screen. The SW-10 also incorporates a simulated block mode transmission, allowing users to go off-line, fill the screen and edit text, and then go back on-line to transmit the data. *General Terminal Corporation, Tustin, CA.*

**Circle No. 219 on Inquiry Card**

### **Image Analysis Microcomputer System.**

Image-80 allows the user to build a database of tracings input from the system's digitizing tablet. Lines and sets of lines within the database can be interactively accessed by their user-defined attributes, measured values (e.g. length and area), spatial location, or relationship to other lines. A video interface option allows the user to trace over the output of video cameras attached to microscopes. The system uses a 512 x 480 intelligent graphics terminal and

a digitizing tablet to support an interactive software package. The host microcomputer has a Z-80 microprocessor, 64Kbytes of RAM, and either a 10Mbyte hard disk or two double density floppy disks (optional). The system uses a CP/M compatible operating system. Image-80 is available in a number of configurations *Laboratory Computer Systems, Inc., Cambridge, MA.*

**Circle No. 210 on Inquiry Card**

### **High Speed Direct Connect**

**Modem:** TRS-80 DC-1200 high speed direct connect modem (76-1005) operates at either 0-300 or 1200 baud. With high speed 1200 baud operation, time charges (and in some cases, affiliated long distance charges) for timesharing or information retrieval services may be greatly reduced. The DC-1200 can operate asynchronously at 0-300 baud.

*Radio Shack, Fort Worth, TX.*

**Circle No. 231 on Inquiry Card**



**Computer Furniture:** The mini leggett is especially designed to be an all-purpose work station. This space saver is designed for the mini and microcomputers with detachable keyboards. It has a swing up aluminum document holder and surface areas to accommodate the video terminal, printer, keyboard and disk drive. *Health Science Products, Inc., Birmingham, AL.*

**Circle No. 258 on Inquiry Card**

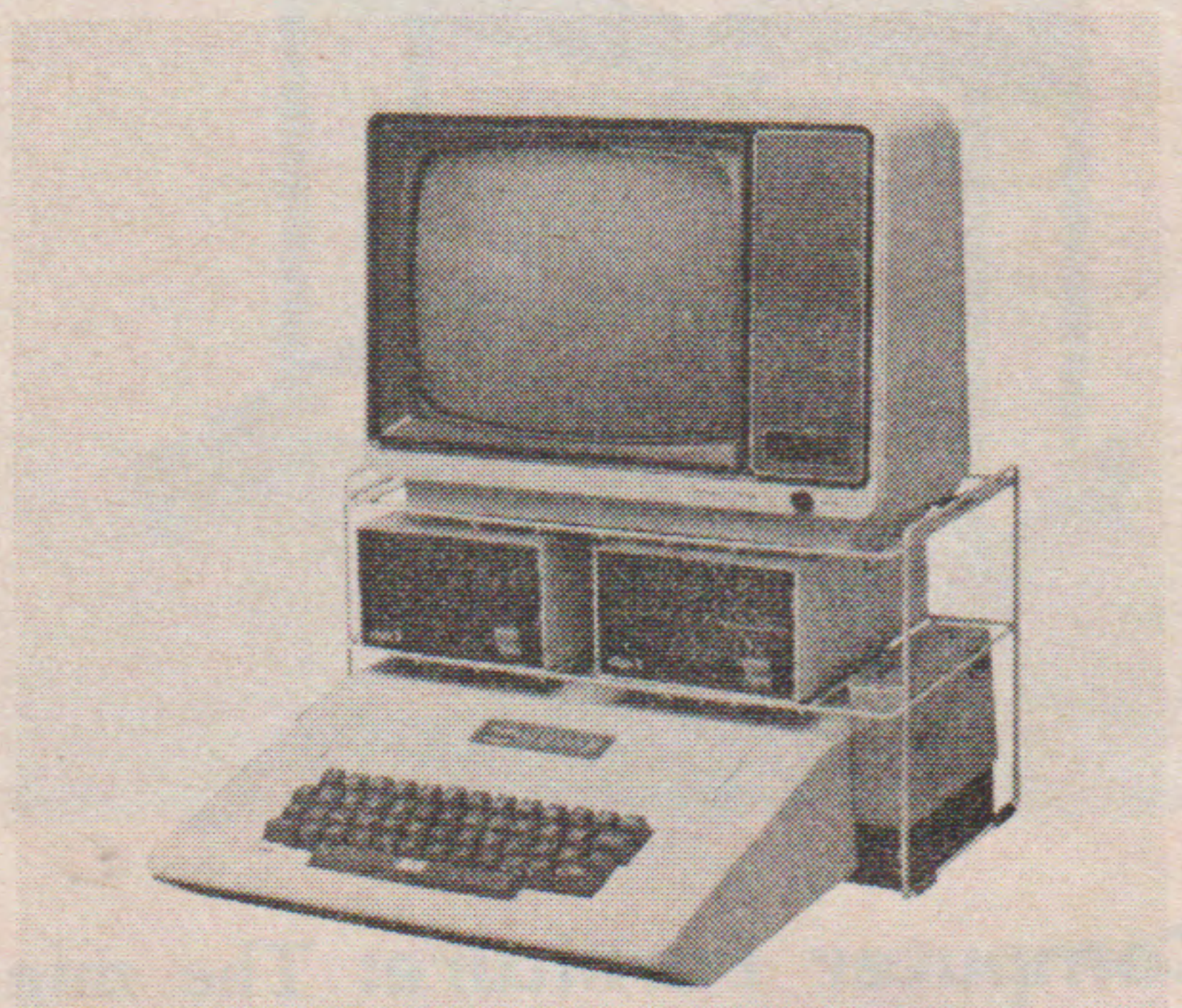




**Computer Scheduler** - A scheduling tool for computer planning, the Expand-A-Plan modular computer schedule/four partitions system offers maximum visibility of an entire schedule for a two week period and insures simplicity in updating and changing future scheduling. *Methods Research Corp., Farmingdale, NJ.*

**Circle No. 333 on Inquiry Card**

**THE APPLE STACKER:** is a rack designed to stack and hold securely your Apple II computer system compactly, neatly and make any surface a work station. Built from heavy gauge steel with a chip resistant finish it compliments your Apple II computer. There is no need for cooling fans in this rack system as the large



open grid of the rack allows air to flow freely. It will support two disk drives and a large monitor and has space to store diskette boxes when not in use. Almost invisible, it is designed to showcase and not detract from your systems appearance. Educational Discount Available. *Universal Industries, Los Angeles, CA.*

**Circle No. 354 on Inquiry Card**

**Diskette Suspension Files:** were specifically designed to protect and organize magnetic media. They are constructed of non-glare, anti-static formula plastic, and completely protect vital areas of the diskettes. The files are available in either letter or legal size, and will accommodate the diskettes, related documents, and an index card. *Ring King Visibles, Inc., Muscatine, IA.*

**Circle No. 255 on Inquiry Card**

**DEC-Compatible Computer Furniture:** This line of furniture matches the standard-size VAX-11/780 cabinets in both appearance and function. A single cabinet with a 27.5"x30" footprint can accommodate up to four of the company's 160-Mbyte Winchester storage systems with all associated hardware — including controller, CPU interfaces, and power supplies. The performance of the single-cabinet Winchester stack is enhanced by the availability of up to four individual seek mechanisms. For greater throughput, the disks can be attached to two controllers on the same CPU. The furniture can be ordered with all components (disk, tape, SBI adapters, power supplies, etc.) already installed and ready to plug into the CPU. Several different configurations are available. *System Industries, Milpitas, CA.*

**Circle No. 347 on Inquiry Card**

**Apple Plug Compatible Diskettes:** The A-70 and A-40 diskettes have a jumper selectable boot PROM for 13 or 16 sector integer Basic or Pascal as standard features. Both diskettes have state-of-the-art band positioning instead of a plastic cam, plus an advanced media positioning system. The model A-40 provides 40 tracks of storage and has a track to track speed of 5ms. The A-70 has the same features of the A-40, but provides 70 tracks of storage capacity. *Micro-Sci, Orange, CA.*

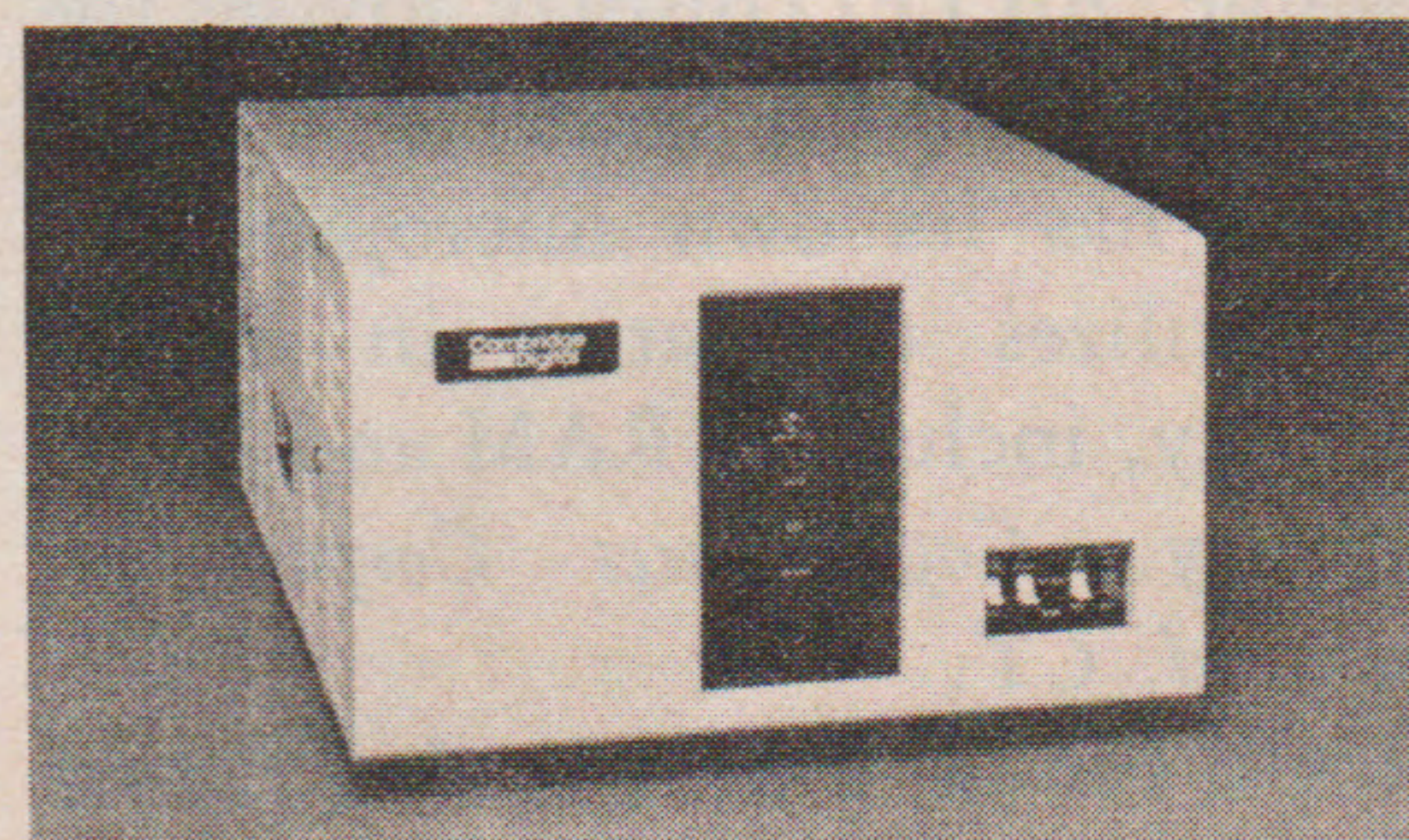
**Circle No. 235 on Inquiry Card**

**New Font Styles for Spinwriter Character Printers** — NEC Information Systems has fifteen new font styles for its Spinwriter letter-quality character printers. All of the newly announced fonts offer extensive foreign language printing capabilities and include Letter Gothic Multilingual A, Prestige Elite Europe A, Prestige Elite Europe B, Elite 12 Norwegian, Elite 12 French, Elite 12 Swedish, Courier 72 British, Courier 72 French, Courier 72 German, Courier 72 Norwegian, Courier 72 Swedish, Prestige Elite 12 British, Prestige Elite 12 German, Prestige Elite 12 Norwegian and Prestige Elite 12 French. All the fonts are offered on NEC's "thimble" print element which can utilize up to 128 different characters on a single element. *NEC Information Systems, Inc., Lexington, MA.*

**Circle No. 203 on Inquiry Card**

**Powerful LSI 11/23Based System:** System 94 is a fully integrated DEC PDP-11/23 microcomputer with a 70-Mbyte Winchester disk and 20-Mbyte streaming tape. Housed in a compact stand alone or rack mounted enclosure, the System 94 offers 256-Kbytes of high speed MOS RAM, expandable to 4-Mbytes; four serial I/O ports and a large, extended LSI backplane. The high-speed Winchester drive is formatted as two RIO7 and one RKO6 drives on a single control. The system can be expanded to include: real-time clock; analog to digital and digital to analog converters; serial I/O multiplexers; synchronous I/O ports; large-scale memory; floppy disk subsystems, and more. *Cambridge Digital, Cambridge, MA.*

**Circle No. 227 on Inquiry Card**







**Stand-Alone Emulator** — Operating as a self-contained, stand-alone system, the MicroEmulator is a powerful and user-friendly in-circuit emulation tool for integrating microprocessor hardware and software. The modular system design allows emulation support of a variety of 8-bit and 16-bit microprocessors. The system includes a built-in 80X24 line CRT terminal, a full-travel ASCII keyboard with special function keys for full-screen editing and soft keys for entering system commands. The MSE3001 comes complete with an 1800 Series personality module and emulator pod to support all 1800 Series microprocessors. The system can be used as an emulator in conjunction with any host development system. Programs developed on the host computer can be downloaded in ASCII formatted data to MicroEmulator's memory via RS232C port at baud rates selectable to 19.2K baud. *RCA/Solid State Division, Somerville, N.J.*

**Circle No. 204 on Inquiry Card**

**IBM Bisync Emulator** - IBM Bisync-80 communication protocol emulator enables RAIR Black Box microcomputers running under CP/M or MP/M to emulate standard IBM 2780 and 3780 terminals.

Bisync-80 enables a RAIR Black Box to be used as a powerful development system linked to an IBM mainframe, utilizing standard IBM Remote Job Entry support on the mainframe. Mainframes and remote devices supported include IBM 360, 370 and 30-Series computers, IBM 2780, 3780 terminals, DEC PDP-11 and VAX-11 computers and other devices equipped with BSC communications capability.

RAIR Bisync-80 allows the transfer of files between a RAIR Black Box microputer and a remote terminal processor.

Bisync-80 can also translate character coded files between the ASCII character set used in the microcomputer system and the EBCDIC character set used by IBM terminals and computers. *RAIR Microcomputer, Corp., Santa Clara, CA.*

**Circle No. 341 on Inquiry Card**

**1000 Series Winchester Disk Subsystems:** It integrates the CAMEO controller with the Data Peripherals Lynx and Puma Winchester drives. These high capacity subsystems offer from 10 megabytes to 160 megabytes of on-line data that can be added to your system.

The CAMEO 1000 series controllers are implemented with large scale integration (LSI) technology and can sustain extremely high speed operations, limited only to the clocking rate of your computer. The controllers utilizes E.E.C. and C.R.C. error detections for virtually error free media without requiring host computer processing time.

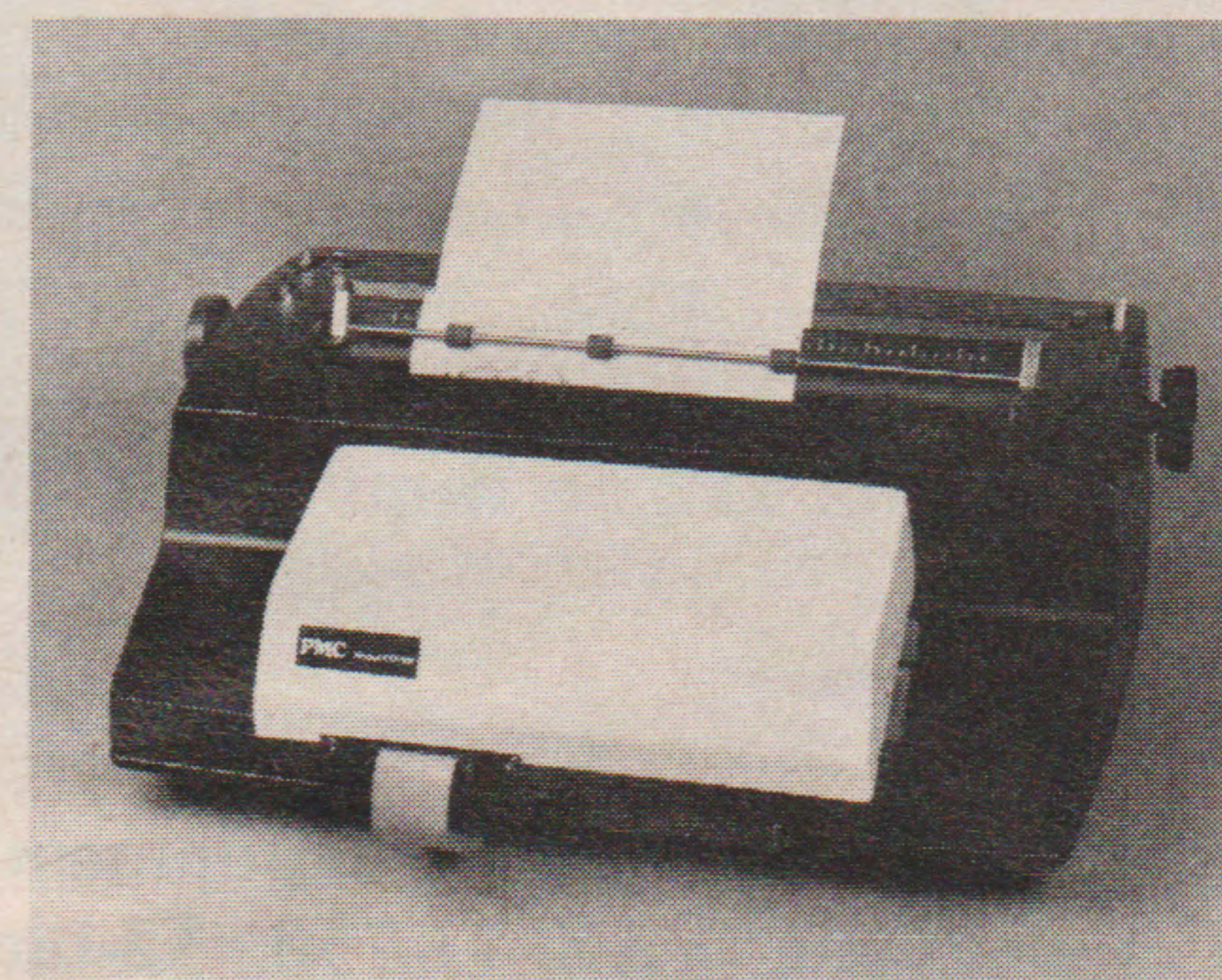
The standard 1000 series subsystems are the 1010 Subsystems, a Data Peripheral Lynx drive (10 megabyte removable Winchester); the 1040 Subsystem, a Data Peripheral Puma drive (40 megabytes fixed Winchester); the 1020 Subsystem, 2 Data Peripheral Lynx drives (20 megabytes of removable Winchester storage); and the 1050 Subsystem, a combination Lynx/Puma system. *Cameo Electronics, Inc., Anaheim, CA.*

**Circle No. 201 on Inquiry Card**

**Computer Graphics System:** features decision support and presentation capabilities. Designed for training and educational use, this system features a proprietary data compression technique to give instant-recall full-color video displays and automatic generation of high-resolution

slides and viewgraphs. It can be used as an "electronic slide show" for training sessions, school & college lectures and seminars, conferences, and similar sessions. It can also be used in cross country symposia since instant full-color graphics can be displayed simultaneously at multiple sites using ordinary dial-up telephone lines. The system offers more than 32,000 different color choices, plus the ability to create special type faces, illuminated letters, and other intricate artwork. Components include a mini-computer, a 13- or 19-inch color monitor, CRT terminal for computer input, and an optional "drawing board" and cursor for free-form graphic input. *Management Graphics, Inc., Mnpls., MN.*

**Circle No. 211 on Inquiry Card**



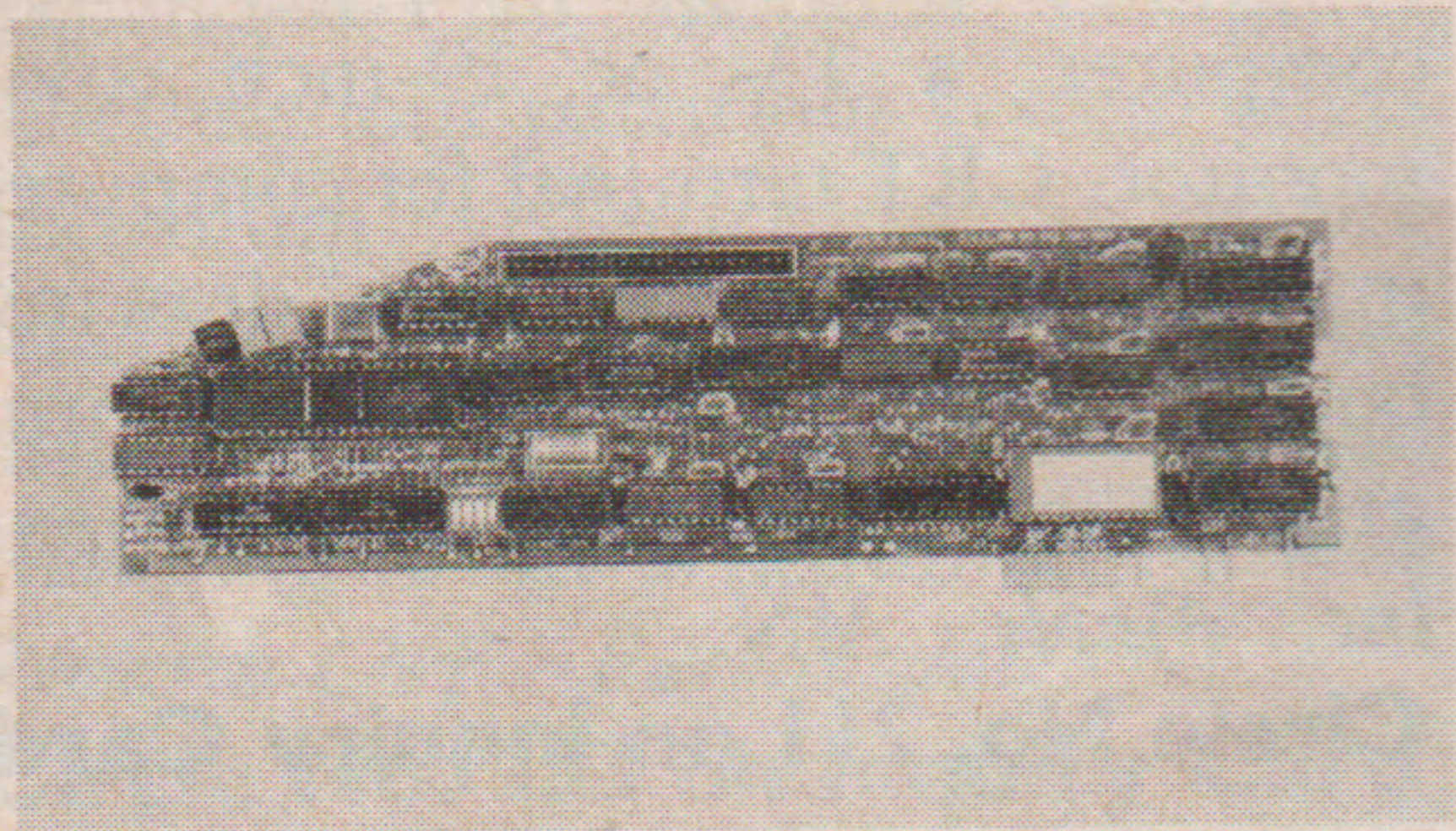
**Turn Your Typewriter into a Printer:** The Electric Typing Fingers (ETF-80) peripheral turns an IBM Selectric or equivalent typewriter into a fast, letter quality, economical printer. Interface cables are available for many different microcomputers, including TRS-80, PMC-80, PMC-81, EPS-80, and Apple II. An adapter for the IBM Personal Computer is also available. The unit is placed on top of the typewriter keyboard, plugged into the parallel printer port of the microcomputer, and the Selectric is ready to start printing. No modification of the typewriter is necessary and no additional software required. All memory space is available, making the unit fully compatible with any processing program. *Personal Micro Computers, Inc., Mtn. View, CA.*

**Circle No. 357 on Inquiry Card**



### **8" Megabyte Systems for Aple**

**II:** The capability of the ZVX4 control card has been expanded by providing a convenient "backup" utility for Corvus hard disk systems via 8" floppies. Using SVA's AMS 8000 8" floppy turnkey system, over 2 megabytes of removable media can be "on line" with the Corvus. Also, Qume, Siemens, Persci or any ANSI standard 8" drive system will operate with the ZVX4 controller. The 8" floppy provides: 1) faster access to specific data



files, 2) data transportability, 3) proven reliability, 4) longer media life and 5) ease of generating multiple copies. *Sorrento Valley Associates, Inc., San Diego, CA.*

**Circle No. 232 on Inquiry Card**

**VAX-11/730:** Digital Equipment Corporation's VAX-11/730 32-bit minicomputer supports interactive graphics work-stations using Digital's VS11 terminal for engineering design, as well as educational and commercial applications with up to 24 concurrent users. The VAX-11/730 uses 64K-bit RAM chips for a maximum memory complement of five megabytes, and can be configured as a single-cabinet system. *Digital Equipment Corp., Maynard, MA.*

**Circle No. 352 on Inquiry Card**

**Roll-A-Drawer:** is a two drawer cabinet, the file drawer designed to hold hanging printout binders. The Roll-A-Store is a storage cabinet with an adjustable shelf. Both these items lock, have double wheel casters, and fit under any workstation. *Atlantic Cabinet Corp., Williamsport, MD.*

**Circle No. 353 on Inquiry Card**

### **Design Station Feature Free**

**Graphics +:** Dicomed D38+, a remote, freeform graphic design station, features automatic curve smoothing capability similar to manually created French curves and a new figure type called Flexigon which allows operators to create smooth, curved graphic shapes in seconds. Other features include rotation, full diagnostic capability, an extended display list, people-oriented prompts, 64 colors, interpolation and multiple typefaces available in any combination on a single graphic display. *Dicomed Corp., Minneapolis, MN.*

**Circle No. 229 on Inquiry Card**

### **Card Permits CP/M 80 Com-**

**patibility:** A plug-in card that lets the Victor 9000 computer run either 16-bit CP/M 86 or 8-bit CP/M 80 software, with up to 80 megabytes of Corvus hard-disk storage is called Victor-80. Based on a Z80 microprocessor with 64K RAM running at up to 6Mhz with no wait states, the card plugs directly into any of the computer's four internal expansion slots and allows all standard CP/M version 2.2 software to run without modification on the Victor 9000. *Small Systems Engineering Corp., Palo Alto, CA.*

**Circle No. 260 on Inquiry Card**

### **New CGC 7900 Product En-**

**hancements** — Five new product options for the CGC 7900 color graphics computer system offer these features: 1) ACT I interface makes it possible to attach an ACT I non-impact ink jet copier to the CGC 7900 system for copying raster images or ASCII text directly from the graphics computer display memory; 2) ROM Expander Card is a standard size CGC 7900 digital circuit board that can expand the present 7900 ROM capability from 64K bytes to a maximum of 512K bytes when four cards are utilized; 3) Remote Fixed Disk, CGC 7900 computer system can be configured with one or two Winchester drives, one or both of

which can be remote to the physical CGC 7900 housing; 4) 49-Track Tape Interface will support a number of standard tape drives; 5) Digitizer Tablet is an 11 x 11 inch tablet with stylus and 5- or 16-button cursor. *Chromatics, Tucker, GA.*

**Circle No. 214 on Inquiry Card**

### **8-Bit, Single-Chip Microcontrol-**

**lers:** A new eight-bit microcontroller offering higher performance as a stand-alone, single-chip computer for controller and arithmetic processor applications is available from Intel Corporation. The model 8052 is an expanded member of the MCS-51 family of eight-bit microcontrollers.

Designed from the powerful 8051 single-chip computer core, the 8052 features the most memory offered on a single-chip microcontroller. It expands on-chip, read-only memory (ROM) from 4K bytes to 8K bytes; and adds an additional 128K bytes of random-access memory (RAM) for a total of 256K bytes.

The 8052 and a ROM-less version of the 8052 — the 8032 — will be available in May 1983. Both the 8052 and the 8032 are compatible with the 8051 eight-bit, single-chip microcontroller.

Another 8052 feature is a third 16-bit timer/counter with 16-bit auto reload which can significantly reduce controller system software requirements. *Intel Corp., Chandler, AZ.*

**Circle No. 329 on Inquiry Card**

### **DEC Emulating Terminals:**

Cobar Models 3100 and 3132 are DEC VT52/VT100/VT132 emulating terminals. Optional features in the DEC Terminals are standard in 3100 and 3132. Cobar Models 3100 and 3132 feature such enhancements as smooth and smart scroll, set-up prompt legends display, screen save, user programmable graphics capability, green or amber phosphor, extended display memory, current mode interface, etc. *Cobar, Inc., Anaheim, CA.*

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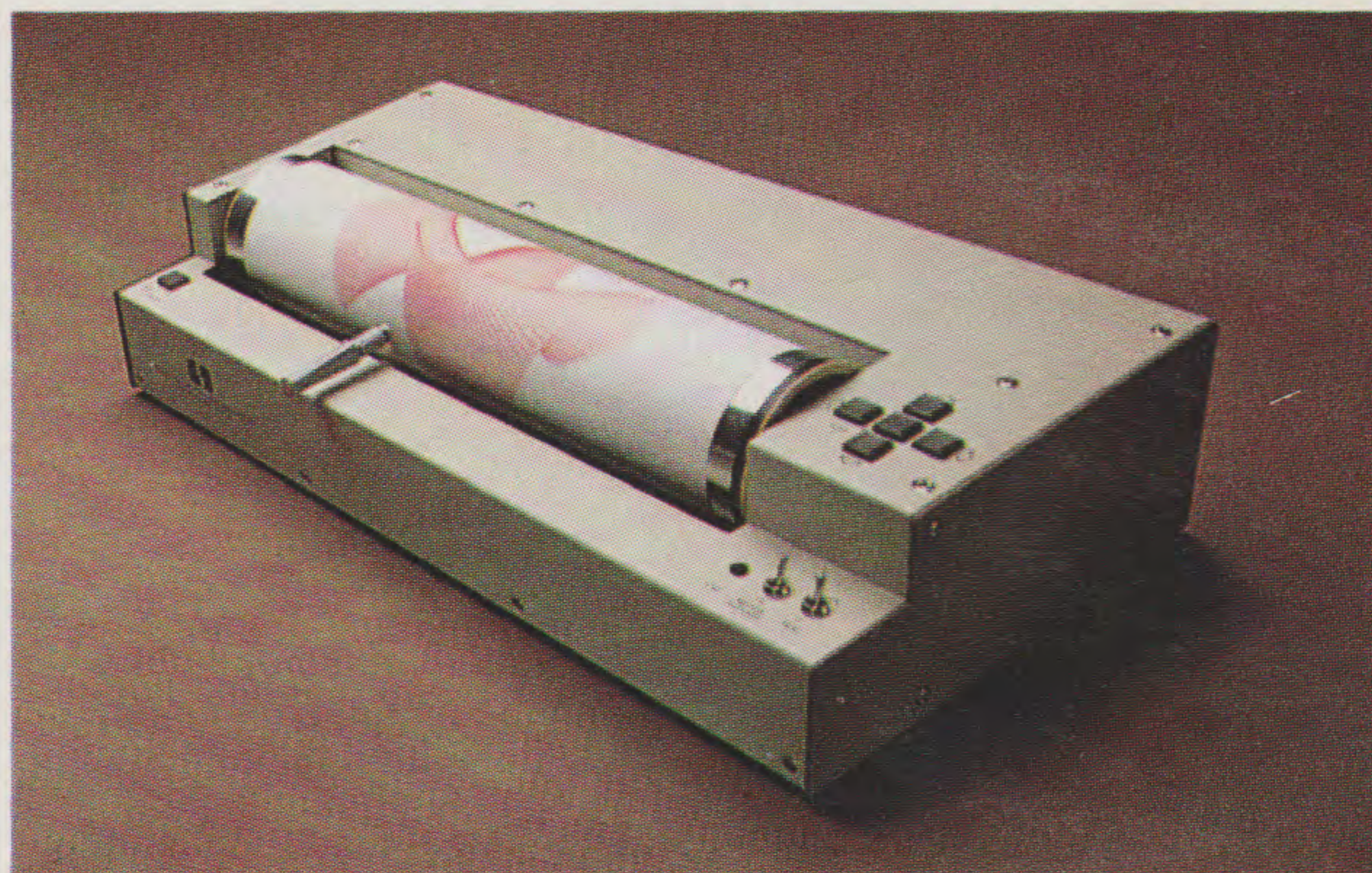
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